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The Farmer's Digest

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUG. 24, 1912, AND MARCH 3, 1933, AND JULY 2, 1946, of the Farmer's Digest, published 10 issues a year at Fort Atkinson, Wis., for October 1, 1954.

State of Wisconsin
County of Jefferson
SS

Before me, a Notary Public in and for the State and County aforesaid, personally appeared Hugh Highsmith, who being duly sworn according to law, deposes and says that he is the publisher of the Farmer's Digest and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, and July 2, 1946, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher and digest editor are: Publisher, Hugh Highsmith, Fort Atkinson, Wis.; editor, L. Bush-Brown, Ambler, Pa.

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3. That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages or other securities are: none. Signed, Hugh Highsmith, Publisher.

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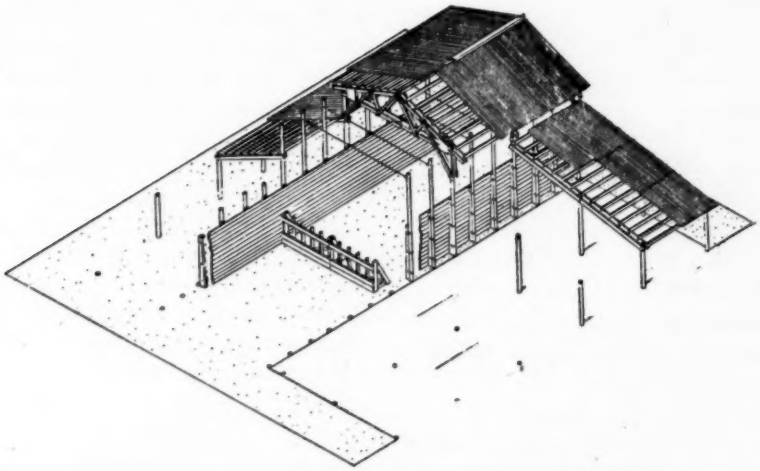

New Idea Promises Lower Building and Labor Costs

Oregon's self-feeding silo is feeding 60 cows and saving $100 per month in labor . . .

Condensed from Corvallis Gazette-Times

Marion Teal, Farm Editor

A multi-use, pole-frame barn that is being used as a self-feeding silo is reducing labor cost by $100 a month, according to two Oregon State College researchers.

Animal husbandman, Joe B. Johnson, and agricultural engineer, L. W. Bonnicksen, report that the silo has successfully fed 60 head of beef cattle for 3 months. Building costs for the

Reprinted by permission from Corvallis Gazette-Times, Corvallis, Oregon

70 by 24 foot building (not including sidesheds) would be about $3,500 for farmers. Costs would drop to $2,000 to $2,500 if a farmer used only his own labor. The silo is 10 feet high, will hold 300 tons of silage.

Johnson and Bonnicksen point out that the building is just a covered shed open at both ends. The entire floor of the center area is of concrete, extending out enough at the ends so the cattle stand on concrete when feeding.

Silage is put in the building as it is in a trench silo. Material can be brought in the open ends and dumped on the concrete floor and then moved about by a tractor blade to a height of 10 feet, as high as the side walls. Of course, the silage should be well packed to prevent spoilage, the tractor pressing it down thoroughly. It is important in this silo, as in any other type, to use some kind of material — beet pulp, ground corn cobs, or whatever is recommended and available in any area—to absorb silage juices, so that valuable food nutrients will not be wasted in liquids which drain away.

If the silage is elevated or blown, the feed rack is used as an end wall. Then the tractor can be removed from the top of silage by driving it over loading planks onto a truck and from there onto a ramp or embankment.

The college experiment has shown that the 21-foot feed rack with 12 feeding spaces at only one end is enough to handle 60 cattle, because the animals all do not eat at the same time. There was very little spoilage. However, silage could be fed at one end and hay at the other end, if desired.

The college experiment also has shown that the movable feed racks now in use do not get pushed forward sufficiently by the cattle, so must be pushed by tractor. But this does not require much labor.

There's enough room atop the 10 feet of silage for tractor clearance. The space will be used for hay storage in the college building.

Bonnicksen and Johnson say that other types of feed racks could be used—such as a suspension variety which the cattle could push forward—but they believe this would permit more waste of feed. With the kind in use, there is very little waste. Having feed racks at both ends does not mean that twice as many cattle can be fed, because the 300 tons of silage which this building will hold is about the right amount for 65 beef cattle for the winter.

The center area of the building now used as a silo could be

used in other ways. The silo walls are removable. With some rearrangements to allow ventilation and protection from moisture, the structure could be used to store grain. It might be practical for some farmers to store barley this way for a few years and then convert the bin to livestock use.

Also, the center could be used for hay storage alone, or as a machine shed, or with movable gates it could be partitioned into pens for various animals.

Two types of sheds could be added to the main structure. One could be a narrow shed with a concrete floor and bunk that would be used for grain feeding. The other could be a wide shed with dirt floor which would serve as a loafing shed. Poles and walls were pressure treated and should last about 35 to 50 years.

Plans for the multi-use pole-frame barn may be obtained by writing to the Agricultural Engineering Specialist, Department of Agricultural Engineering, Oregon State College, Corvallis, Oregon.

The complete set of plans consists of:

Type of Drawing	Title	Oregon Plan No.	Sheet No.
1. Pictorial view of barn	Multi-Use Pole-Frame Barn	7211-1	1
2. Plain view	Multi-Use Pole-Frame Barn	7211-1	2
3. Cross sectional view	Multi-Use Pole-Frame Barn	7211-1	3
4. Pictorial view of roof	Pole-Frame Trussed Roof	7034-3	1
5. Details of truss	Pole-Frame Trussed Roof	7034-3	2
6. Details of silo wall	Pole-Frame Silo Wall	7035-2	1

The cost of the above complete set of plans, 6 sheets, is $1.85. If you order, **Order plans by number and name.**

In addition to the above plans, Extension Circular 559, "Pole-Frame Construction," is needed for additional details and information on construction and erection. Extension Circular 552, "Making Trench and Stack Silage," gives information which would be of aid when the multi-use barn is used as a silo. These circulars are available free (in single copies) from the Clerical Exchange, Oregon State College, Corvallis, Oregon. Plans for the feed rack are not available.

HOW TO GRADE UP A BEEF HERD IN A HURRY

This Texas ranch raises better beef at lower cost after only four years of performance testing, artificial breeding and pregnancy tests. . .

Condensed from Farm Journal

Charles E. Ball

BUILDING a good beef herd takes a lifetime for most people. But Tom and Tobin Armstrong, uncle-nephew ranching partners in Kenedy County, Texas, don't want to wait that long.

In four years they have come a long way in improving an already good herd. Here's their system:

1. Use the scales to be sure that only the fastest-gaining animals are kept for the breeding herds.

2. Breed artificially to reduce the number of bulls needed, and to make it easier to test young bulls.

3. Test for pregnancy, to tag shy breeders **quick**, and get them out of the herd.

That's quite a program, of course, and it takes extra time and money. But the Armstrongs are satisfied that the investment is paying off for them.

The Armstrongs have about 2,500 cows, more than 1,475 of which are accredited and certified Santa Gertrudis purebreds, on their 50,000-acre ranch in south Texas.

They check and double-check calves for their ability to gain, both on range and in the feedlot. The tagging, sorting, and weighings take time, naturally. But most of that comes back quick in feed saved, when the tail-enders are culled out.

As dry as it's been in this part of the country the last couple of years, that's really important.

"I don't see how you can miss with this system," says Tobin.

Reprinted by permission from Farm Journal, Philadelphia, Pennsylvania

"By cutting out the light-end bulls and she stock each year, our weight averages are bound to be better. Even with the droughts, we've been able to keep up our averages—something we couldn't have done without having a sure method of culling the slow gainers."

"Artificial breeding has two big advantages," declared Tom Armstrong. "First, we can use several promising young bulls, and use them early, without having to pen cows in separate pastures. As soon as a cow is bred, she goes into the main herd. When the calf is dropped, we check the cows number and our breeding records.

"Another advantage, of course is that we can breed the outstanding bulls to many more cows. In 1952 we used a proved bull to settle 397 cows. That's more calves than we could have gotten from him in a lifetime, with natural service."

Here's what you'll need to breed artificially, the way the Armstrongs do it:

- A holding area where you can collect semen every other day.
- Extra help to round up and check cows twice a day.
- Pen and squeeze chute in or near the pasture for cows being bred.
- A good technician and a small laboratory. The Armstrongs hired a man who had experience in dairy insemination work. Total equipment cost for the laboratory and semen-collecting ran about $150.

G. A. Comhaire, the Armstrongs' technician, is anxious to try frozen semen. "If it works for us, we can collect semen in the spring from all of our bulls —that's when they produce the best quality product—and use it as needed during the rest of the year," he believes.

"We wait for four years before using any one bull extensively," explains Tobin. "We want to observe progress of his offspring until they have raised calves. We want to know that they are fertile, good mothers, and milkers."

Pregnancy testing fits into the Armstrong program, because it enables them to cull dry cows out before winter feeding time. In 1950, 72% of the cows that were bred dropped calves. Next year it was up to 81%, and in 1952 it hit 85%. Last year it was down to 75% because of the worst drought in the history of the ranch.

The Armstrongs pay 75 cents to $1 a cow for the pregnancy test. They hire a specialist who makes accurate rectal palpation tests as soon as 35 days after conception.

There's obviously a lot of record-keeping with the Armstrong system. Tobin's wife, Anne, does most of it. She keeps cards on

each animal in the herd—age, weight at different ages, calf crop, weights, and so on. These cards are the basis for the "cull or keep" decisions.

If you don't want to spend a lifetime grading up a beef herd, the Armstrongs should have some ideas that you can use. On some of them—like the artificial breeding or pregnancy testing—you might want to team up with neighbors.

Green Chopped Forage Has Some Limitations

If you're thinking about feeding fresh-clipped forage to your beef or dairy cattle in drylot next summer, here's a list of pointers from Colorado A and M College.

Rodney H. Tucker and Paul S. Pattengale give these suggestions:

It is important to keep a supply of green chopped forage in front of the cattle at all times. Some farmers have experienced trouble with bloat if the cattle run out of the chopped forage for several hours and then receive a fresh supply.

It may be best to drop the chopped forage out of the ration and use hay for the last 4 to 6 weeks before marketing day to "dry up" the cattle just as you would with pasture-fed cattle.

You should plan to chop once a day, which means you must be sure before you start that you will have labor available for the job each day, and equipment in good working order.

You will need a forage chopper that cuts and chops directly from the field in one operation if you are going to get the most economy from the clipped-forage feeding plan.

You probably won't need to feed any protein supplement with the chopped green forage. An Iowa State College experiment indicated that protein supplement increased gains but not enough to pay for the added cost of the supplement.

Most tests have indicated that feeding clipped green forage will give greater gains per acre of forage and more carrying capacity than can be obtained by grazing pastures. This extra value may or may not more than pay for extra labor it takes to feed this way. A lot depends on the efficiency of handling the clipped green forage, they explain.

Don't expect to control all bloat problems by chopping the forage instead of pasturing it. Some farmers have experienced less bloat in their cattle when they fed the forage clipped in drylot. Others have reported about the same amount of bloat as they had when the cattle were pastured.

Colorado Extension

Why I Like A One Litter System

If you are short on equipment, feed and labor; this program may be what you are looking for . . .

Condensed from Successful Farming

Hans Dickinson

YOU can find all kinds of hog-raising systems these days. Some follow a two-litters-a-year system, others three litters, and lately the multiple-farrowing idea has caught on. Bayard Scott, Vinton, Iowa, doesn't follow any of the systems mentioned above. It isn't that these systems aren't good, Bayard said—it's just that they don't fit his particular farming program.

Bayard has sows farrow once a year—in August—and pigs from these sows are kept on the farm until the following summer when prices are usually highest, especially for heavy hogs.

This system is quite different from what we usually think goes to make a successful hog-raising program. The main idea usually is to push hogs to market just as fast as possible.

"Pushing hogs to market in 5 or 6 months is fine if you have the labor, equipment, and feed to do it with," said Bayard, "but I don't have enough of any of these items. So, I decided about 4 years ago to try raising only one bunch of hogs a year, and to substitute as much roughage as possible for corn. I also worked out a plan where the pigs practically take care of themselves, and I don't need much equipment.

"I knew it would take quite a bit longer to get hogs to market, but I figured the saving in money and labor might make it pay," Bayard added. So, for the past 4 years this young farmer has been farrowing his sows in August and selling the pigs one year later.

Here's how the system works: Sows are bred in April for August farrowing. At farrowing

Reprinted by permission from Successful Farming, Des Moines, Iowa

time, the sows run in a 100-acre, steeply rolling, wooded pasture. The sows farrow right out in the woods without shelter other than the trees and ravines. No farrowing equipment is needed, and death loss is amazingly low.

Bayard makes one trip through the pasture each day during farrowing. He spots where sows are about to farrow and throws out a little corn and supplement. He does the same for sows that have already farrowed. Water is provided by several small creeks running through the pasture.

"In my part of the country, August is the ideal month for farrowing out in the open," Bayard said. "It seldom, if ever, gets cold or damp. And letting sows run loose over the pasture surely cuts down on disease problems. The sows and pigs aren't crowded together and are on clean ground. When the litters are a week or so old, the sows begin to bunch up so feeding can be done at only one or two places in the pasture."

Soon after farrowing, sows and pigs are turned into good alfalfa pasture. Bayard feeds a normal amount of grain and supplement from the time pigs go on pasture until the first of December. He wants his pigs to weigh about 90 to 100 pounds by this time. Gilts are picked in December, separated from the fattening hogs, and are fed a normal ration for the rest of the winter.

Around the first of the year, Bayard begins increasing the chopped or ground alfalfa in the ration. At the same time, he begins cutting the amount of corn and protein fed. This hog raiser goes on the theory that the time for greatest grain feeding is from weaning to 90 pounds.

From January until the following July, the pigs get about 2 pounds of corn per head per day plus all the alfalfa they will eat. This feeding program has resulted in hogs reaching 230 to 260 pounds on 8 to 9 bushels of corn.

In May, the hogs go on pasture. At this time they usually weigh about 150 pounds. The hogs stay on pasture, and are fed 2 pounds of corn apiece per day, until sale time in July or August. If necessary, pigs are full fed for one or two weeks to bring them to the desired finish.

"This system of raising hogs will work as outlined, or it can be modified to meet changing conditions," said Bayard. "For example, this past year the sows were bred back at weaning time and sold at a premium in December. Also, because of a strong winter hog market, the faster-gaining pigs were finished for March sale with the balance readied for summer sale."

Feeding the Dairy Calf

Every dairy farmer should have an understanding of the processes of digestion in the young calf . . .

Condensed from Pennsylvania Farmer

H. H. Havner

ON an average a cow's productive life is about four years. This means that two heifers must be raised annually for every eight cows.

Approximately four per cent of the whole milk produced in the United States is fed to calves. Since the cost of raising calves to maturity is a considerable item of expense in the dairy farm operation, only those calves that give indications of growing into profitable cows should be selected for herd replacements. And the calf that is selected for this purpose should not be neglected.

Below is a summary statement by Mr. Gilbert H. Porter, who is studying for an advanced degree at the Pennsylvania State University. It deserves careful study and can be of help to dairymen in raising their dairy calves.

The Ruminant Stomach

A knowledge of the structure of the ruminant stomach as it exists in the young calf and the changes that take place during the first year of life should help one to appreciate the necessity for certain calf feeding recommendations.

The four compartments that are found in the adult ruminant stomach are present in the newborn calf, but the relative size of the various compartments is not at all similar. In the cow, the rumen or first stomach accounts for about 80 per cent of the entire stomach capacity. But when that cow was born its rumen plus the two adjoining compartments accounted for only 30 per cent of the overall

Reprinted by permission from Pennsylvania Farmer, Pittsburgh, Pennsylvania

stomach capacity. By the time the calf reaches 10 to 12 weeks of age, the rumen has changed in relative size to twice as large as the fourth or true stomach. At one year of age, these proportions have shifted to that of the mature animal, where the rumen is by far the largest single compartment.

Some investigators claim that the maximum capacity of the true stomach in the newborn calf is two quarts, and for the entire stomach, less than one gallon. The mature cow of medium size has a total stomach capacity of from 30 to 40 gallons. Large animals may have a capacity as high as 75 gallons. It is therefore apparent that with the development of the calf to maturity, the stomach grows more rapidly than the remainder of the body. Where a 100-pound calf may increase in weight at maturity by 12 or 14 times, its stomach probably will have increased in capacity some 40 or 50 times.

In the young calf, the liquids consumed by-pass the rumen and flow directly into the true stomach. It is not until solid feedstuffs, such as hay and grain, are eaten that the rumen and the second and third compartments commence to function. Therefore, during the early weeks of life, the calf's digestion process is similar to the human and its daily ration must be highly digestible and low in fiber. When the rumen has had an opportunity to develop, only then is roughage digested to any appreciable extent.

Amount of Feed and Energy

Because of its limited digestive storage facilities, the young calf cannot handle much food at a time. It has been felt that the calf cannot use roughage to any great extent until it is five or six months of age. However, recent studies at the Ohio Agricultural Experiment Station suggest that appreciable roughage utilization can be obtained prior to four months of age. Nevertheless, during the early weeks of life, the great majority of the energy and/or nutrients the calf ingests must come from milk and concentrates.

Water

Contrary to some opinion, even when consuming large amounts of milk, the calf needs water in addition, particularly during warm weather. For successful calf raising, clean water should be available at all times.

Regardless of the method followed of feeding calves, all should be started similarly. That is, see that the calf gets its first few feedings from the dam. This first milk (colostrum) from the dam is of utmost importance to the calf because:

Colostrum contains about 10 times as much vitamin A as normal milk (Most newborn calves

are deficient in vitamin A reserves). It is rich in antibodies (needed for resistance to disease). And it has a high protein content plus most other essential nutrients.

Whether you wish to leave the calf and dam together for two or three days or separate them a few hours after birth is not as important as making certain that the newborn calf receives at least two feedings of colostrum.

Amount of Milk

Calves are more often overfed than underfed. Overfeeding usually results in digestive disturbances and scours. Never during the first two weeks of life should more milk be offered a calf per day than ten per cent of its live weight. Thus, an average Jersey calf would receive no more than five or six pounds of milk daily. A Holstein calf weighing 90 pounds would not be fed over nine pounds per day.

Nipple Feeding

If calves being fed from pails show a high incidence of scours, the use of nipple pails might be advantageous. (Caution: nipple pails must be scrupulously clean —as must any piece of equipment used in calf feeding.) Milk cannot be gulped when using nipple pails. This fact decreases the possibility of milk entering the non-functional rumen and putrifying there.

Temperature of Milk

Milk being fed to the young calf should be around 100°F., which is very close to body temperature. In any event, every effort should be made to feed the milk at the same temperature each feeding. Feeding milk at 98°F. one feeding and 80°F. the next is an open invitation to scours. After the calf is a month old, the temperature of the milk assumes somewhat less importance.

Methods of Raising Calves

Today there are five basic methods of raising calves.

1. The nurse-cow method.
2. The whole-milk method.
3. The skim-milk method.
4. The calf-starter method.
5. The milk-replacement method.

Due to the expense involved in the first two methods and the scarcity of skim-milk found on dairy farms in fluid milk areas, the majority of dairy calves are being raised by the calf-starter or milk-replacement methods. In that most farmers are well acquainted with the calf-starter method, it might be helpful to discuss in some detail the most recently developed method—that of using milk replacements.

In an effort to reduce the amount of whole milk used in starting the calf to even less

than that used in the calf-starter method, milk replacements have been developed that entirely replace milk in the calf's ration after the first few days of life. (It must be understood that these milk replacements are not intended to take the place of colostrum.) Such replacements are being successfully used, and calves are raised on a very limited amount of whole milk.

A milk replacement differs from a calf-starter. It is extremely low in fiber and contains only feeds of exceptionally high nutritive value. Further, the protein and vitamin levels in the milk replacements are much higher.

When using a milk replacement, the feeding directions should be closely followed and the very best management practiced if satisfactory results are to be obtained. Calves when fed milk replacements often do not show as much bloom as those raised with whole milk, but usually do make fully as

RATES OF MILK REPLACEMENT FEEDING [a]

Days of Age	Milk pounds		Water pounds		Replacement pounds	
	LBb	HBb	LB	HB	LB	HB
1-4	3	4		Dam's Milk		
5-7	2	2	1	2	0.2	0.2
8-10	1	1	3	3	0.3	0.4
11-28	0	0	4	5	0.4	0.5
29-42	0	0	5	6	0.5	0.6
43-49	0	0	6	7	0.6	0.7
50-56	0	0	6	7	0.6[c]	0.7[c]

a. Amounts listed fed twice daily.
b. LB stands for light breed, HB for heavy breed.
c. Feed once daily during eighth week.

CALCULATED SAVINGS BY USING MILK REPLACEMENTS

Selling Price of Milk 100 lbs.	Value of 250 lbs. of Milk	Cost of 40 lbs. of Milk Replacement @ 12 Cents per lb.	Saving per Calf	Cost of 40 lbs. of Milk Replacement @ 16 Cents per lb.	Saving per Calf
$2.00	$5.00	$4.80	$0.20	$6.40	—$1.40
3.00	7.50	4.80	2.70	6.40	1.10
4.00	10.00	4.80	5.20	6.40	3.60
5.00	12.50	4.80	7.70	6.40	6.10
6.00	15.00	4.80	10.20	6.40	8.60
7.00	17.50	4.80	12.70	6.40	11.10

good gains. After eight weeks of age, when they are removed from the milk replacement and continue to be fed a good grain and hay ration, they make satisfactory gains and develop into heifers just as healthy as those fed whole milk for a longer period of time.

Is it economical to feed milk replacements? Unless the cost of the milk replacement is less than the value of the milk it replaces, it is not a sound practice financially. One can calculate the feasibility of feeding a replacement by assuming that 40 pounds of milk replacement will save 250 pounds of whole milk. In other words, its feeding value will depend on the price of the milk saved and the cost of the replacement.

Hay for Calves

A few days after the calf is born, green, fine-stemmed, sweet-smelling hay should be made available in small quantities and frequently replaced. When calves are being raised on minimum milk, good quality legume hays are advised due to their high protein, vitamin and mineral content.

Weaning the Calf

The calf should be weaned gradually. It is generally considered good practice to reduce the milk intake gradually over a period of 7 to 10 days. Above all, make certain the calf is eating hay and grain well before eliminating milk entirely.

Cattle Feeders Ration Protein by Adding Salt

An increasing number of southwestern cattle are taking their oil meal with considerably more than a grain of salt these days as a result of recent experiments at the Southern Great Plains Field Station at Woodward, Okla.

For some years cattlemen have added salt—as much as half salt and half meal in some cases—to regulate the amount of self-fed protein supplement that cattle consume. They recommend the practice to other cattle feeders as a labor-saving means—supplements can be put out weekly instead of daily.

The scientists at the field station have found that loose salt, with cottonseed meal or meal-grain mixtures can be used to hold daily consumption of protein supplements to the desired level.

Larger, more vigorous animals move on to other grazing after eating their fill, leaving plenty for smaller, weaker or more timid animals, the researchers report.

The scientists also say a salt-meal mixture helps train calves to eat supplements. And bunks may be placed away from water to encourage animals to graze equally over the range.

Missouri Farm News

How to Cull the 'Boarders' from Your Poultry Flock

In practically every laying flock there are some birds that are not laying. They not only take up housing space but also eat a lot of feed that they are not helping to pay for.

The hens that stop laying first are the poorest layers, and even if you decide to keep a few hens for the second laying year the last ones to stop laying should be the ones you keep.

If the flock is watched very closely it is very easy to tell when a hen stops laying. By culling as they go out of production you not only save feed but usually the price per pound is higher than it will be later on.

If you have enough good pullets to fill the laying houses you will want to sell the old hens. If there are not enough pullets, and you want to keep some hens the second year, keep the ones that stopped laying last.

If you have not been taking the birds out as they stopped laying, July and early August are the best months to cull. The following selection chart shows the difference between a bird that is laying and one that is not, and also shows the difference between birds that have been laying a long time and the ones that have laid only a short time.

Selection Chart

Character	Condition in a Layer	Condition in a Non Layer
Comb	Large, bright, red, smooth, glossy	Dull, dry, shriveled, scaly
Face	Bright red	Yellow tint
Vent	Enlarged, smooth, moist	Shrunken, puckered, dry
Pubic bones	Thin, pliable, spread apart	Blunt, rigid, close together
Abdomen	Expanded, soft, pliable	Contracted, hard, fleshy
Lateral processes	Prominent, pliable	Hard to find, stiff
Skin	Soft, loose	Thick, underlaid with fat

Characteristics to Show if Previous Production was Continuous or Brief

Character	Condition Associated with Continuous Laying	Conditions Associated with Brief Laying
Vent	Bluish white	Yellow tint or flesh color
Eye ring and ear lobe	White	Tinted with yellow
Beak	White	Tinted with yellow
Shanks	White, rather flattened	Yellow, round
Plumage	Worn, soiled	Not much worn
Molting	Late, rapid	Early, slow

Virginia Polytechnic Institute

A New Winter Rye

The new Tetra Petkus rye, developed in Germany, promises high yields, great vigor and better straw . . .

Condensed from The Rural New Yorker

Carl Ross

THROUGH the history of plant breeding, the development of Tetra Petkus winter rye is notable. Tetra Petkus is a tetraploid, meaning that the number of chromosomes (the determiners of species) in this plant is double that in ordinary rye.

Colchicine, a chemical, was used in its making. The technique of using colchicine in plant breeding was first described in this country more than a decade-and-a-half ago but its practical application on a utility plant was not immediately forthcoming. For colchicine, being a potent chemical, had a number of undesirable side-effects. Twelve years' work that looked sometimes promising, but more often nearly hopeless, was involved in developing the plant to its present condition. Dr. Walther Laube of Berlin, Germany, was the scientist who made Tetra Petkus and he was given the highest awards his country can bestow for achievements in agriculture.

Doubling the number of chromosomes resulted in doubling the vigor of the plant. In fact, this change in the germ plasm made the plant look entirely different from any other cereal. The roots are elaborate and strong; straw, although only medium tall, is robust, and the leaves are broad, fleshy, with a bluish green color that makes a Tetra Petkus field easily distinguishable from far away. The grain is extra large in size.

Commercial distribution of seed in Germany began in 1951. In the Fall of 1950, a small experimental planting was made also in the United States, The plot looked promising, and arrangements were made the following Summer to have the Agricultural and Industrial Development Corporation, Harrisburg, Pa., introduce Tetra Pet-

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kus into the United States and Canada.

High Yields Reported

One of the experiment stations where Tetra Petkus was first tested is New Brunswick, N. J. Dr. Robert S. Snell has had the plant under observation there for the past three years. Last season, it yielded 47.4 bushels per acre as against 32.1 bushels of Balbo rye (a standard variety) and 26.6 bushels of Thorne wheat (considered one of the best). These results were obtained from replicated plots.

Results from other experiment stations were equally encouraging. At the Ontario Agricultural College in Guelph, Canada, the yield was 75 bushels per acre, as against 50 bushels for their standard wheat and 45 bushels for their standard rye. The vigor of this tetraploid may account for the fact that the plant is adapted over a wide geographic area. At Purdue University, Lafayette, Ind., the yield was 64.1 bushels per acre. At the Oregon Station, Corvallis, 57 bushels per acre were harvested.

Under field production in New Jersey and Pennsylvania, and on tests by the experiment station, the yields ran between 44 and 46 bushels per acre in 1952-53. As the newsletter of New Jersey Field Crop Improvement Association commented: Not bad for a crop that normally produces 15 to 20 bushels per acre in this State."

Joseph Seem, Emmaus, Pa., who grew the new rye for the first time was, "amazed to see the wonderful stand of Tetra Petkus despite a late seeding last Fall." Frank Fogelsager of Shippensburg, Pa., seeded 12 acres of the new rye on August 1, 1953. It got off to a poor start because of dry weather but, after some early September rains, Fogelsager was able to turn 25 dairy cows into the feed and keep them there for two months. Last Spring, the rye came back and, after the application of a ton of ammonium nitrate, produced 100 tons of feed as grass silage. Fogelsager is convinced that Tetra Petkus rye belongs in his rotation, particularly for its value as summer silage and fall pasture.

The stiff and strong straw, which is usually shorter than that of ordinary rye, permits application of heavy amounts of fertilizer without danger of lodging. Tetra Petkus responds very well to fertilizer application. In fact, for maximum yields it requires a generous amount of fertilizer, particularly nitrogen.

Combining Advantages

The sturdiness of straw is a great help also when it comes to combining. Tetra Petkus combines easily, without straw twisting. There is no shattering of grain. Although the straw is not tall, the tonnage per acre is

substantial, sometimes well over two tons. This should mean a handy side income to farmers who market their straw.

In forage tests in Connecticut and Pennsylvania, Tetra Petkus consistently outyielded any other ryes both in green volume and in dry matter per acre. It lends itself very well to pasturing. The erect plants with the strong roots stand up well to grazing; cows are not able to pull them up. Tetra Petkus is palatable to livestock: in actual tests, having a Tetra Petkus and an ordinary rye plot side by side, cows consistently turned to the Tetra.

No Off-Flavor in Milk

At the Bethesda Lutheran Home, Watertown, Wis., more than 500 people drank milk from cows pastured on Tetra Petkus rye, over a period of two weeks last Fall. Otto Koester, farm superintendent, reports that none said they noticed any off-flavor in the milk. Edgar Jarman of the Blairsville, Ga., Station, writes: "We fed tetraploid rye to cows in dry lots and obtained no off-flavor in the milk."

The vigorous root system and volume of growth point to the good advantage in using Tetra Petkus as a cover crop. Again, the huge fertilizer absorbing capacity is worth emphasizing. This fertilizer, of course, will be available in an organic form to the succeeding crop as the cover crop decomposes. The decomposing roots provide a storehouse of plant food for the benefit of the next crop at a favorable depth. Thus, the roots of succeeding crops are forced to push down deep, too, which enhances their resistance to drought and lodging or other adverse conditions.

Cultural Practices

Cultural practices of Tetra Petkus are about the same as of ordinary ryes. It prefers a well packed seedbed. Sowing rates in the Fall may range over a wide period of time which helps in fitting it into the crop rotation. In the Northeast, it is usually seeded after corn has been laid by, and on into mid-summer. A seeding rate of one and a half to two bushels per acre is recommended.

There is one special rule that must be observed when growing Tetra Petkus for grain: it must not be grown side by side with ordinary rye. The pollen of ordinary rye if it touches the tetraploid plant, may cause reduction in grain yields. The distance of necessary isolation will vary; when the ordinary rye blooms earlier, such as Balbo does, the danger of yield loss is not too great. The Minnesota Station, St. Paul, recommends that, "fields should be at least 100 feet from other rye varieties to get maximum yields. Isolation of large fields is not so important as it is for small plots." Other cereals, such as

wheat, barley or oats, may be freely grown adjacent to Tetra Petkus rye.

Improved Quality

In Tetra Petkus, not only were yields increased over ordinary rye varieties but the quality of harvested grain has also been greatly improved. Distillers report that five to six per cent more alcohol was gained from Tetra Petkus than from standard distillers' rye. Flour mills obtained some six per cent more flour than from standard ryes. In tests at the A. D. Wilhoit Laboratory, Minneapolis, Minn., an independent cereal research institution, the loaf of bread made of Tetra Petkus flour (same grain weight) was 16 per cent larger than that made of ordinary rye.

Thus, not only high comparative yields per acre, especially on poor and rather sandy soils, but a premium price for the harvest of this new type rye will also contribute to maximum profits for the growers. With higher yields than from wheat production, there is no reason why much of the rye bread consumed in the East could not be provided from locally grown grains. Ground rye has been fed to dairy cows, with good results, when it does not exceed 40 per cent the grain mixture. Thus used, it has a feed value almost equal to barley and corn.

In any event, be it for cash crop or for cover or forage crop, this new rye is destined to become an important addition to agriculture. Limited quantities of seed will be availabe for distribution through seed houses this Fall.

'Pre-Starter' Pig Ration Has Limits

Taking the baby pig away from his mother at five to seven days—and feeding him on a "pre-starter" ration is not practical for the average hog raiser.

That's the contention of Harry Moxley, extension animal husbandman at Michigan State College.

Moxley admits that the recently developed feed that takes the place of sows' milk at five to seven days is a big help when a sow farrows too many pigs for her milk supply.

But, he asserts, the ration will have to be manufactured much cheaper than it can be now in order to make it practical for the average hog raiser. Don't forget, he reminds, that the sow's milk is almost no cost compared to pre-starter ration—even if the price is reduced considerably.

A pre-starter ration recently developed by Iowa State College contains dry skim milk, sugars, soybean oil meal, lard, toasted corn flakes, antibiotics, vitamins and trace minerals.

Michigan State College

ARTIFICIAL BREEDING GROWS AND GROWS

There are many advantages to be gained from the use of proved sires . . .

Condensed from The Southern Planter

HERD improvement through better breeding is one of the important developments taking place on dairy farms.

Artificial breeding is not new. In fact, the technique is supposed to have been used by Arabians in the breeding of horses before the time of Christ. Many scientists in this and other countries have contributed to the knowledge of the subject of artificial insemination. In the United States, particular credit is due the research and extension workers in the Land-Grant Colleges and the U. S. Department of Agriculture for the progress made since it was first started commercially in New Jersey in 1938.

Less than 8,000 dairy cows were bred artifically in 1939. By 1946 the number had climbed to 53,000; by 1952 the national total was 4.3 million or about 18 per cent of all milk cows. The number continues to increase.

A big advantage of artificial insemination is the opportunity of obtaining maximum benefit from proved sires. No matter how much care is exercised in the selection of a young bull, there is always the danger that he will lack the ability to transmit proper type and high production to his offspring.

Comparatively few farmers can afford to use a bull sparingly until the sire's first daughters come into production and their record compared with their dam's. Yet this is the acid test for determining the ability of the bull to transmit high production. Furthermore, bulls old enough to be proved are frequently too big for many farmers to want to own, and they may have become ill-tempered and thus require more elaborate facilities for safe care than many farmers feel they can provide.

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Even if a farmer is financially able and willing to prove a sire, or to buy one that has been proved, the bull under normal conditions would not be used to breed more than about 50 cows per year. On the other hand, a bull in a stud which supplies semen to artificial breeding associations is used to breed many times this number.

For example, there were 2,324 bulls used in artificial breeding in the United States in 1952, and in that year the average bull was bred to 1,848 cows. This is further illustrated by the following data for North Carolina. In the Asheville Artificial Breeding Stud, Guernsey bulls were bred to an average of 4,079 cows in 1952, Holstein bulls to 6,140 cows, and Jerseys were bred to an average of 3,327 cows per bull. The highest individual bull of any breed was a Holstein bull named Staffordshire Chieftain Montvic who during 1952 was bred to 10,758 cows.

Hog Outlook For 1954-1955

The 1954-55 hog picture is taking shape. Purdue University agricultural economists now say that average hog prices in the new marketing year, starting October 1, will be $3.00 to $4.00 below the past year. They expect the seasonal low in hog prices to come in late October or early November.

After that, economists see some improvement on the horizon for hog prices. From November on through July 1955, prices should continue at levels permitting near normal feeding returns.

In releasing part of their hog outlook now, Purdue economists are careful to add that the hog-corn ratio will probably fluctuate around the long-time average of 13.6 to 1 for the first 10 months of the new marketing year. After mid-summer 1955, the ratio is likely to become unfavorable and stay that way for the balance of the calendar year.

What then are the prospects for hog profits in 1955? Hogs marketed before August 1955 should return near normal profits to hog producers. After July or early August, returns may be below average. Farmers will probably be better off to market as much as possible of their 1955 crop before that time.

Purdue University

What Dad Means To Us—At age 5, Dad is the greatest man in the world. At age 15, Dad is a dollar machine. At age 20, Dad is a good chap but somewhat of a back number. At age 25, wonder how Dad has done it. At age 35, Dad what would you do about this? At age 50, Dad sure was one grand guy. At age 60, Dad always used to say.—*Meaty News*

Veterinarian's Notebook . . . . No. 8

How Vaccines and Serums Do Their Work

In layman's language, an English Vet answers your questions about the hypodermic needle . . .

Condensed from Farmer and Stock-Breeder, London, England

"I'm dashed if I can understand the difference between all these injections you keep on pushing into my animals. Some are vaccines, some are serum. How do they stop the animal getting disease?" That's the sort of question I'm often asked. These days of advanced science must be a bit baffling to the average farmer now that the hypodermic syringe has replaced the bottle of medicine to a large extent.

It's really not so difficult to understand, or at least the principles are not.

The body of any animal has certain "lines of defense" against germs. First of all there are certain tissues in the body, like the tonsils, which are known as lymphatic tissue. These are a great barrier against germs. Then there is the actual fluid part of the animal blood (the serum) and contained in that serum are both red and white blood cells. It is the white blood cells which play a most important part in protecting the animals against disease.

Now germs produce their effects on the animal by manufacturing what are known as toxins. These toxins are chemical poisons and it is these which make the animal ill.

When Bacteria Threaten

Those are the two sides which are "lined-up" against each other in this battle for health. The bacteria and their "toxins" on the one side and opposing them the white blood cells, the blood serum and the lymphatic tissues.

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The animal, however, has "one or two cards up its sleeve," so to speak. The first and most important one is that when a bacterium or its toxin enters the animal's body, the animal immediately produces antibodies. These are best described as "neutralizers" to the bacterium and its poisons. That is only the start! The blood serum, in response to the arrival of the bacteria, starts to produce substances which dissolve the bacteria, cause them to collect in clumps, to break up and even to fall out of the blood stream altogether.

All these things make it a lot easier for the white blood cells to pounce upon the bacteria and digest them, and having digested them, carry the remainder away to somewhere like the liver or kidneys to be excreted.

The resistance of an animal to disease is known as immunity. You all know that some people are more resistant to colds than others. In just the same way some animals are more resistant (have a stronger immunity) to disease than others.

This immunity may be inherited. For example, a certain animal in a bunch of animals does not contract a disease although the rest of the bunch get it. This is inherited immunity applied to an individual animal. Then there is the case of certain breeds which inherit immunity. For example, Indian cattle are fairly resistant to anthrax. This same inherited immunity applies to species also—for instance, sheep do not get swine fever. Cows do not get glanders.

Most immunity, however, is not inherited, it is acquired. It may be acquired "naturally," for example, the dog which has got over distemper is resistant to another attack, or it may be acquired "artificially" and this is where "all your injections" come in.

Vaccines and serum are just methods of giving animals resistance to disease.

Vaccines like contagious abortion vaccine, are solutions containing the germ (which causes these diseases) in a weakened state which when injected into the animal stimulate the body to produce antibodies. These antibodies circulating round the system give the animal a strong resistance or immunity to the disease concerned. In a nutshell, vaccines stimulate the body to produce antibodies.

Contains Antibodies

What about serum? That's a different thing altogether. Serum already contains antibodies and these are passed straight into the animal's body by means of an injection. In these cases the animal doesn't even have to produce its own antibodies, they are put there ready for use. Serum is produced in the laboratory by giving small repeated doses of the bacterium

to an animal (for example, in producing swine erysipelas serum the horse is used).

After a time the animal's blood stream is "charged" with antibodies against that germ. The blood serum or part of it is then drained off, undergoes certain treatments in the laboratory and is then bottled for use on your farm if necessary.

These then are the main differences between vaccine and serum:—

(1) Vaccine stimulates the body to produce antibodies. Serum already contains antibodies.

(2) Vaccine produces a reaction in the animal. Serum produces no reaction usually.

(3) Vaccine gives a prolonged effect. Lifelong in some cases. Serum only lasts a short time: 3 weeks.

(4) Vaccine is hardly ever used when a disease is rampant on a farm. Abortion vaccine is an exception. Serum is always used when a disease is rampant.

(5) With vaccine the immunity takes about ten days to develop. With serum the immunity is immediate.

I hope the next time your vet. says "We had better give these a dose of serum" you'll know just what he means.

You Can Sell Milk As Veal

During this period of declining milk prices, the production of veal calves can help maintain incomes of dairy farmers and reduce the volume of surplus milk sold, points out Gerry Heebink, Extension dairyman at West Virginia University.

Veal calves that weigh around 200 pounds sell for about twice as much per pound as calves a few days old, Heebink stresses. Farmers can get veal prices for both the birth weight of the calf and the additional weight put on it by feeding enough milk to sell it as a good veal calf.

Heebink lists these points to consider on whether or not to sell milk in the form of veal: (1.) Local prices paid for veal calves and surplus milk. (2.) Each pound of gain in weight requires about 10 pounds of milk. (3.) Calves on nurse cows or those fed liberal amounts of whole milk should gain from 1 to 2 pounds a day. (4.) Greatest daily gains are usually made by calves with the higher weights at birth. (5.) If help is short, time can be saved by raising veal calves on nurse cows.

West Virginia University

REPEAT BREEDERS ARE EXPENSIVE

Several interesting experiments are solving some problems with non-breeding dairy cows. . .

Condensed from Michigan Farmer

Cal Orr, MICHIGAN STATE COLLEGE

WHAT'S being done about those repeat breeder dairy cows? They're costing Michigan dairymen 15 to 20 million dollars a year. That's figuring one month's lag in calving—from the normal 12 months—for the one million cows of breeding age in Michigan. The cows would average 20 pounds of butterfat in that month.

Those loss figures are conservative ones from Dr. James Williams of Michigan State College's School of Veterinary Medicine. He admits that he's leaving out the loss of an estimated 6 per cent of the cows which are eliminated from herds because of breeding trouble.

But the loss points up the importance of the Experiment Station's research on repeat breeders. Drs. Williams and Donald H. McWade, and C. W. Duncan, an agricultural chemist, are hard at work on the project.

Support for the investigations comes from the Michigan Artificial Breeders' Cooperative. It's an outstanding example of farmers who are using self help to solve their problems. The MABC members have contributed $15,000 a year for the past 5 years for the research.

Dairyment Can Help Prevent

Although there's still a lot to learn about the subject, the researchers have reached this conclusion: A dairyman can do something about most of his repeat breeders himself. The scientists contend that only a small percentage of cows fail to conceive because of inheritance.

Williams and McWade found reason to support that idea while they were gathering breeders for their research project. They visited many farms in search of cows that had been bred repeatedly without conceiving.

They found that many dairymen kept records which didn't give enough information—it was impossible to tell from the

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records why the cow failed to conceive. They still wondered if it were due to reproductive disease or just to breeding at the wrong time.

And they suspected the farmers were breeding back these cows too soon after calving. Thirty per cent of the cows in herds they examined for fertility were bred back in less than 40 days after calving. A cow's uterus is not ready for the next pregnancy in that time, Williams and McWade contend. It takes from one to one and a half months, often longer.

In other cases, farmers hadn't detected early abortion. That's another argument for keeping good records. Records will show if the "in heat" time is normal. If it's not, McWade and Williams say, better look for an aborted fetus. And when you find it, call a veterinarian. That's so he can send a specimen to the laboratory in order to tell what caused the abortion. If the cause is a disease, it's important to know which one it is for treatment.

Then, there were cows that were not turned out of the barn regularly. This means that a farmer couldn't detect the cows in heat at the right time. "Standing heat" is the best way to tell, the latest research shows. And this is important, too, because the best conception rates are when cows are bred from the middle to the end of the heat period.

Have Heifers Examined

And William and McWade contend that a veterinary examination of heifers could be a profit saver for dairymen. One out of 8 of the repeat breeder heifers they assembled for the project had something wrong with the reproductive tract. If the defect couldn't have been corrected by surgery, the heifer could have been eliminated from the herd immediately.

But there are conditions that can't be detected now by examination of a live animal. The vets admit that more needs to be known on how to make a more accurate diagnosis of such conditions. Post-mortem studies of some of the cows that failed to conceive showed a disease or physical abnormality in the uterus, oviducts or ovaries.

But good management isn't the entire answer to repeat breeding.

Thus far, the researchers and Agricultural Chemist Duncan have completed experimental results with 27 cows. Here are other things the research indicates.

What cows are fed apparently makes little difference on the conception rate. The researchers compared an excellent ration with an average farm

feed. The top ration was excellent quality hay, grain and mineral supplement, along with trace elements. It was higher in protein and calcium than the average feed, too. The average ration included grass hay that was low in carotene and in protein. But calcium, phosphorus and iodine were added to meet the minimum needs of the cows.

Nearly 73 per cent of the cows getting the excellent ration plus hormone treatments conceived. Of those getting the average ration, 69 per cent had calves—not enough difference to be considered important. Cows that didn't conceive weren't helped by hormone treatment.

There were difficult births for some of the cows. There were some cases of retained afterbirth and in one cow there was a uterine prolapse—uterus turned inside out.

Part of the cows, after they conceived, were sent back to the owners. And the farmers are furnishing data on gestation and calving.

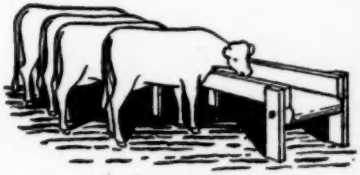
As an indication of the importance of research on repeat breeders, experiment stations in other states are stepping up their research on the problem, too. At Cornell University in New York, scientists are pinpointing their investigations on the nutrition of heifers—from birth to maturity.

At the New Jersey experiment station, scientists are concentrating on the genetic factors that may have a bearing on the conception rate of cows. Pennsylvania State University is studying the effects of different levels of total digestible nutrients on bull calves. In New Hampshire, studies are underway on the nutritional aspects of reproduction troubles, and in Connecticut, scientists are concentrating on studying the effect of disease on reproduction.

Many scientists believe that the conception problem is one that will challenge the best research techniques for years to come. But new information, however small it may be, is of immense value to dairymen plagued with this discouraging, bank account-dwindling situation.

A hen must drink nearly a pint of water to make one egg, remind Purdue University extension Poultrymen. That's why egg production may take a slump if layers find ice instead of water in the fountains or troughs. An investment in one of various types of heaters will soon pay its way in more eggs and less labor.

Three Years of Loose-Housing



After three years of testing at Michigan State, they agree "the pen barn is here to stay" . . .

Condensed from Guernsey Breeder's Journal

R. C. Lewis

ON November 15, 1951, the Michigan State College Brown Swiss herd was moved from its comfortable stanchion barn to a new loose-housing barn. It was a cold, raw day such as is often experienced in Michigan during the late fall. The effect of this sudden exposure to the cold on the production of the herd was a matter of some concern. However, milk production appeared to be unaffected by the change.

That was the first experience with the loose-housing of dairy cattle on the College farm. During the three years which have followed, Holsteins and Jerseys, in addition to the Brown Swiss, have been maintained in one of two loose-housing developments. Most of the problems confronting dairymen who go into this type of housing have been encountered. Therefore, some of our experiences may help readers who have, or are considering, loose-housing for their dairy herds.

Many farm visits with dairymen having this type of housing were made before building the facilities at the College. Some of these farmers liked loose-housing because of its economy, convenience and flexibility. Others who were having trouble keeping their barn, exercise lot and cows clean were sorry that they had changed from the conventional barn.

A New System of Management

After visiting with these dairymen, it seemed evident that loose-housing is more than just another type of cow barn. A new system of herd management is involved with freedom and efficiency as its goals. The cows are not pampered as in stanchion barns. Instead of a relatively

Reprinted by permission from Guernsey Breeder's Journal, Peterboro, New Hampshire

warm stable, the animals are exposed to out-of-doors temperatures. Ideally, hay and silage are not hand-fed but are stored so that the cows can eat directly from self-feeders whenever they choose. Concentrates are fed and the milking done in a small room where an entire herd may be milked in three or four stalls. Manure is hauled from the lounge area once or twice a year.

Many of the observed cases of dissatisfaction with loose-housing appeared to be due to the farmer's inability to adapt his old management or facilities to the new system. Some had tried to combine parts of the loose-housing system with their old stanchion barns and consequently lost the advantages of each.

With the view that loose-housing is a system of management as well as a type of housing, our aim has been to develop plans and practices which will be economical and convenient for the operator and at the same time meet the needs of his cattle.

Arrangement of Loose-Housing

Loose-housing should be thought of as being composed of six areas: The lounge or bedded area, milking room or parlor, milk house, exercise lot, feed and water, and young stock. Each area is a distinct division and has certain requirements which must be met if the system is to work satisfactorily.

The lounge should provide about 50 square feet of area per cow. The cattle will trample the bedded area less if the lounge is approximately square. Facing the lounge barn to the south or east will protect the resting cows from direct gusts of wind. Maternity and calf pens are often constructed along one side or end of the lounge. Protection of these pens from drafts and the proper ventilation of the entire lounge to prevent condensation is particularly important.

The milking room and milk house should adjoin each other and may be in a separate building or, as in our housing, occupy a portion of the lounge barn. The milking room does not require elaborate equipment, but should provide a pit in which the operator stands while milking. When the cows are elevated, the milker can work more comfortably and the udders are on a level where it is possible to do a better job of preparing and milking.

If the cows have to walk up or down an incline at the milking room, steps are more desirable than a ramp. Animals frequently slip and sometimes fall on a ramp but seldom have trouble mastering steps.

When the milking room is located in the lounge barn, it should be provided with a summer and a winter entrance for the cows. A summer entrance opening from the exercise lot permits closing the lounge area

during the pasture season. A winter entrance from the lounge allows the cows to be under shelter while waiting to enter the milking room.

The cows' exit from the milking room should be near the doorway between the lounge and lot. Studies have shown that about one-half of the cows will go into the lot immedately after milking. Traffic across the bedded area can be reduced if these animals leave the milking room near a lounge exit.

Locating the milk house adjacent to the milking room reduces milk carrying to a minimum and is especially desirable where a pipeline installation is contemplated.

The hay barn, with the mow at ground level, should be at the west or north side of the exercise lot for protection of this and the lounge area from wind and snow. A self-feeding trench or stack silo may be located on the third side of the lot.

Roughages should be as nearly self-fed as possible to take full advantage of the loose-housing system. True, self-feeding is virtually impossible since it is usually necessary to move hay to the bunks once or twice daily. Silage, too, may have to be loosened and moved short distances. However, if movable feeders are placed in front of the hay and silage, much of the work of carrying feed is done away with.

Feeding roughages in the lounge area is a frequent cause of unsatisfactory results with loose-housing. A major objective of a good arrangement is to encourage the cows to remain outside except when resting. Feeding in the lounge has an opposite effect. It increases the space required per cow, reduces the resting area, causes excessive trampling of the bedding, and makes it difficult to keep the cows and barn clean.

The area around water cups or tanks should be paved as it is usually wet. Waterers should always be located in the exercise lot to save bedding and further encourage the cows to leave the lounge.

The exercise lot, like the lounge, should be nearly square and provide about 50 square feet per animal. It is preferable that the lot be paved, since it can be cleaned more easily. Paved lots should be scraped every week or 10 days during the non-pasturing season. Although difficult to keep clean and dry, gravel, crushed corn cobs, shavings, or sawdust can be used as fill when the exercise lot is not paved. Continuous additions will be necessary, but when corn cobs, shavings or similar materials are used, a foot or more of manure may be removed at the end of each winter.

Heifers should have their own shelter and exercise lot. It is often convenient to house them

in one end of the hay barn where they can eat from the back side of the same mow as the cows. Dry cows may also be placed with the heifers or they may remain with the milking herd. In either case, a trough should be placed in the lot for feeding concentrates to animals not passing through the milking room. When the dry cows are left with the milking herd, they should be fed concentrates while the remainder are confined for milking.

Effect of Weather

One of the first questions asked by dairymen is the effect of bad weather on the eating and production of cows in loose-housing. So far no adverse effects have been noted. Even on stormy days the cows appeared to eat a normal amount of roughage and production was not affected noticeably. The only effect of stormy weather which has been observed was that the cows returned to the shelter of the lounge immediately after eating, instead of loitering in the yard as they normally did during good weather.

Records have shown the open lounge barn temperature to average five to eight degrees above the outside temperature. Furthermore, the manure pack, a few inches below the surface, was always between 70 and 90 degrees. Therefore, even in the coldest weather, the cows had a warm bed.

Reducing Bedding Requirements

Most reports on loose-housing have stressed its high requirement for bedding materials. Actually, the amount is not as high as some investigators have reported.

The bedding requirement is determined by the amount of traffic within the lounge and the time of day at which the material is distributed. When the lounge is bedded in the morning, the straw will soon be trampled and soiled. On the other hand, if the area is bedded after the evening milking, it will receive comparatively little trampling during the night and will still be in good condition in the morning. It is possible to maintain a presentable barn and clean cows with slightly greater straw consumption than is normally required in a well-bedded stanchion barn if chopped straw, a convenient and absorptive bedding, is distributed at the evening milking.

Raising Calves in Loose-Housing

Calves can be successfully raised in loose-housing even during the winter months. Calves under these conditions were removed from their dams on the second day following birth and placed in small individual pens. Heat lamps were hung over

them and during very cold weather were used for the first week or so. After weaning, the calves were placed in community pens or allowed to run loose in the young stock area of the barn. Calf losses under this system of housing have been very slight.

Disease Control A Problem

Claims have been made that less udder trouble and fewer injuries occur in loose-housing than in stanchion barns. However, when ailments do occur, their control offers major problems. Facilities for confining or isolating animals are very limited. The objection of many veterinarians to treating animals in loose-housing would be overcome if at least one stanchion is provided where animals can be held for treatment or breeding. It would be a good idea to have a small hospital room constructed which could be closed off from the lounge area. Here sick animals could be kept warm, isolated and in a convenient place for treating.

Since the treatment and control of disease are difficult, particular attention should be given to their prevention and early detection. One case of ringworm, hoofrot, scours or other ailment is handled much more easily than a general infestation.

Milk Quality

With proper sanitary precautions, milk from a loose-housing barn should be as low a bacterial count as in a stanchion barn. More trouble may be encountered from feed flavors in loose-housing. This is to be expected since cows can eat roughage until shortly before milking. In some tests with the College herd it was found that feed flavors could be detected in the evening milk from most cows. Fewer animals had the flavor in their morning milk. Undoubtedly this was because fewer cows ate hay or silage during the early morning hours.

After Three Years

Three years of experience with loose-housing in the College herd has proved that loose-housing has grown beyond the stage of "will it work." The immediate problem is to improve upon a system which is already good. The economy and convenience of loose-housing insures its continued growth among commercial dairymen whose main concern is producing milk economically.

In spite of the growing enthusiasm for loose-housing, the stanchion barn will continue to be preferred by many dairymen. Since loose-housing is a system of management as well as of housing, some dairymen are temperamentally unable to adjust their practices to take full advantage of the system. Others, who want to adopt loose-housing, will find it impractical to

convert their existing buildings and uneconomical to build new housing. Then, too, many breeders of purebred cattle who desire to display their cattle to best advantage and want to give the utmost in individual attention to their animals will not find this housing to their liking.

Loose-housing has certain advantages and some weaknesses. Anyone who is considering converting to this system will do well to investigate thoroughly before coming to a decision. However, if loose-housing meets the requirements, he need have no fears about its practicality. The loose-housing system of dairy cattle management is here to stay.

Close Clipping or Grazing Damages Grass

Here's new evidence from the U.S. Department of Agriculture that close grazing or mowing of grass during the growing season—especially in periods of stress, such as drought, or in late fall—may interfere with establishment and maintenance of a good stand.

Tests carried out by the Soil Conservation Service at Beltsville, Md., showed that taking off one-half or more of the foliage during the growing season caused grass roots to stop growing for a time after each clipping. This was true for both cool-season and warm-season grass species.

Removal of 40 per cent or less of the foliage, on the other hand, didn't halt root growth at all.

A single cutting that removed more than one-half of the foliage was found to stop root growth for periods ranging from 6 to 18 days. Repeating these severe clippings periodically, as in a system of rotation grazing, prevented root growth of all grasses for 25 to 45 days.

The percentage of roots that stopped growing varied with the amount of top that was taken off. Clipping of 50 per cent of the foliage caused 2 to 4 per cent of the grass roots to stop growing for 14 days. But removing 90 per cent of the foliage halted root growth completely for 17 days, and 40 per cent of the roots were still inactive at the end of a 33-day test.

F. J. Crider, who conducted the tests at Beltsville, says the damage from repeated heavy clipping is significant for both soil conservation and pasture management. Reducing the top by more than one-half, he explains, upsets the functioning of the root system and the plant as a whole. With repeated cutting or grazing of more than one-half the foliage, the grass cannot replenish its food reserves. The plant thus weakened is less able to resist erosion and grazing, as well as drought, cold, and disease.

U.S.D.A.

to do with rough, brushy pasture land. Some of them have found they can afford to spend up to $35 or $40 an acre to clear such land, and another $35 an acre for fertilizer and seed to get it seeded back to a mixture of legumes and grasses.

It is considered uneconomical and impractical to terrace heavy soils of more than 8 per cent grade in Miami county, according to Sam Hertha, work unit conservationist, but farmers are able, without terraces, to hold down slopes of 20 per cent or more by reseeding the proper pasture grasses. Soil tests on poor pasture areas of the county have shown that soil in these old pastures usually is higher in organic matter than much of the county's cropland, and that

Big problem in getting such slopes back to profitable grasses, is that during the period of seedbed preparation and establishing seedlings of grasses and legumes, the soil is subject to erosion.

This problem has been overcome by using wide-spaced wheat or oats to tie down the soil until grasses and legumes can take over the job. Brome grass has proved the most valuable pasture grass, because its far-reaching system of rhizomes insures a stand if original plants survive as far apart as 3 feet or more. Brome also produces maximum grazing and makes good hay.

Where wide-spaced wheat is used in the seeding system, the following program is followed,

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U.S.D.A.

What They Did to Rough Pasture Land

With proper treatment rough, brushy land can be made into productive pasture. . .

Condensed from Kansas Farmer

FARMERS in Miami county, Kansas, are discovering what to do with rough, brushy pasture land. Some of them have found they can afford to spend up to $35 or $40 an acre to clear such land, and another $35 an acre for fertilizer and seed to get it seeded back to a mixture of legumes and grasses.

It is considered uneconomical and impractical to terrace heavy soils of more than 8 per cent grade in Miami county, according to Sam Hertha, work unit conservationist, but farmers are able, without terraces, to hold down slopes of 20 per cent or more by reseeding the proper pasture grasses. Soil tests on poor pasture areas of the county have shown that soil in these old pastures usually is higher in organic matter than much of the county's cropland, and that it often is higher in actual plant nutrients.

Big problem in getting such slopes back to profitable grasses, is that during the period of seedbed preparation and establishing seedlings of grasses and legumes, the soil is subject to erosion.

This problem has been overcome by using wide-spaced wheat or oats to tie down the soil until grasses and legumes can take over the job. Brome grass has proved the most valuable pasture grass, because its far-reaching system of rhizomes insures a stand if original plants survive as far apart as 3 feet or more. Brome also produces maximum grazing and makes good hay.

Where wide-spaced wheat is used in the seeding system, the following program is followed,

Reprinted by permission from the Kansas Farmer, Topeka, Kansas

according to Mr. Hertha:

Seeding date, September 20 to October 10. Seeding rate, 35 to 40 pounds of wheat, 12 pounds of brome an acre. Up to 32 pounds of nitrogen and 65 pounds of phosphate are applied at seeding time according to soil tests.

Then, the last of February or first part of March a legume is overseeded at the rate of 10 to 12 pounds an acre. Usually one half of this is red clover and one half alfalfa. In this combination the red clover kills out the second year, leaving a light stand of clover. However, the red clover gives a first-year hay crop while the grass is getting a good growth.

If nitrogen starvation shows up on this seeding by April a top-dressing of 80 to 100 pounds of ammonium nitrate is applied. This application increases grain yield and keeps grasses and legumes growing at a maximum rate so they are well rooted when hot, dry weather arrives. Wheat in this program has been producing yields of 25 to 35 bushels an acre.

Where oats are used in the reseeding program, all seeding is done in one operation anywhere from the last week of February to March 15. The seeding combination is 1 to 1¼ bushels of oats, 10 to 12 pounds of brome and 6 pounds prairie grass. At the same time 30 pounds of nitrogen and 40 to 60 pounds of phosphate are applied.

The legume and prairie grass may be held out and overseeded the last of March with a Brillion grass seeder. Both methods have been successful.

Where brome seed is mixed with 200 pounds of pelleted fertilizer the drill should be set to apply 400 pounds of fertilizer, says Mr. Hertha. Brome makes the mixture bulky enough so only the correct amount of fertilizer actually will be applied. Oats wide-spaced in this program usually yield 35 to 50 bushels an acre.

Another problem farmers must overcome in seeding rough ground is getting a seedbed that will meet the physical requirements for grass and legumes. The ideal seedbed has firm, compact, moist soil under the seeds, sufficiently fine, but granular soil at the top to cover the seeds (a powdery seedbed blows, washes and crusts badly), and a surface free of irregular depressions or ridges.

Farmers generally report the harrow is too flexible to fill in small depressions in the seedbed. A float drag which is not more than 4 inches high will

prepare a seedbed meeting requirements, says Mr. Hertha. The drag should be used, he points out, so you are crossing depressions and ridges at an angle to be most effective in planning the ground.

Where the original pastures to be reseeded are brushy, clearing usually is done by bulldozers. "This is more successful than cutting trees above ground and contending with stumps and roots," says Mr. Hertha. Where soil tests show need for lime, this should be applied before starting the reseeding program.

Pastures are not grazed the first year under this system but the trash hay should be cleared off and baled. A top-dressing of 100 to 200 pounds of ammonium nitrate usually is needed in the spring. However, if 200 pounds are used, half is applied in fall and half in spring.

A farmer following the program can expect a grain crop (wheat or oats) the first season. He then has hay and grazing as further crops from lands that in most cases formerly produced only poor pasture before being reseeded.

Inexperience with b r o m e grass often leads farmers to make mistakes, says Mr. Hertha. Mistake No. 1 is to plow under what appears to be poor stands. "If there is a plant every 2 or 3 feet the rhizomes will take care of filling in," he says. Mistake No. 2 is to graze too close at first. "A little experimenting soon shows the farmer how close to graze brome."

Altho reclaiming rough, hilly land is the most spectacular part of the Miami county program, use of wide-spread grain and fertilizers to establish brome has become widespread.

In 1946, farmers in Miami county had only 250 acres of brome and of this acreage only a small part was well established. The reseeding program began in 1947. Now, about 2,500 acres of brome are being seeded each year.

Beef Cut Unspoiled After 80-Year Wait

An order of roast beef a customer failed to call for in 1874 still hangs in a butcher shop in Banbury, England, shrunken from its original 13½ lbs. but unspoiled. Edwin Walker, whose predecessors took the 1874 order, said he couldn't think of throwing the aged beef away. The meat has become as much a landmark as the town's hot cross buns.

Journal of Farm Managers

Profit from Horses . . .

. . . is a matter of liking the business and arming yourself with the proper information according to this article. . .

Condensed from Western Livestock Journal

H. H. Reese

THOSE people contemplating going into the horse business for profit should first of all have an aptitude for such a venture. Any business is likely to be much more successful if the one engaging in it likes that type of work. His activities then will not become drudgery but rather will be enjoyable, even though at times they may be difficult and trying.

Take that case of the man that always wanted to raise horses. He devoted his efforts for many years to making his business, with all its vicissitudes, a financial success. Then, with years of ulcers and headaches, he finally saved up enough money to retire to the horse ranch of his dreams, only to discover that he was too worn out to enjoy his horses and the allied outdoor life.

The old story of the "square peg in the round hole" applies here as well as it does in any other line. If a person cannot readily distinguish one horse from another or carry in his mind's eye a picture of horses that will help him identify each animal even after considerable time has elapsed, he may not have the quality that would make him a success in this business. However, a great majority of people do have this faculty. Such ability increases with experience. For those that have not had a solid background of association with horses, ample information and p r a c t i c a l knowledge about them should be acquired before going into the horse game for profit. Many people are interested in horses only from a pleasure angle and these are outside our discussion.

Reprinted by permission from Western Livestock Journal, Los Angeles 58, Cal.

Proper Location. The second important point necessary for successfully handling horses would be the proper location. This should lend itself to the particular phase of the horse business that it is desired to pursue. For those that plan to specialize in training, the locale should naturally be in an area where there is a large horse population.

Considered from a breeding standpoint, the site selected should have available a maximum amount of cheap feed, which usually means ample pasture, because under such conditions most breeding stock can be maintained at the minimum cost. Such a ranch, though, should not be too far from a suitable market, because the opportunity of making money will depend on the ability to turn surplus stock at a profit.

It generally pays to add to buildings and equipment as the business grows, rather than investing in all such items at once. By doing so, help can be kept busy at all times, and money is not invested in equipment that is not bringing revenue. It is presumed in this case that the building is done mostly by the proprietor and his regular help. Naturally a show place is always very much to be desired, and is certainly ideal for those who can afford it and who can charge off at least a portion of such expense to advertising or personal satisfaction. On the other hand, it has often happened that a fine prize-winning horse has been led out of a very mediocre barn. Regardless of the buildings and equipment, however, a neat, well-kept and orderly place has a great advantage in attracting customers.

Foundation Stock. The producing of grade riding horses is decreasing, and the demand for well-bred saddle horses is becoming greater. The law of supply and demand operates in the horse business as in any other. The human population in America is rapidly increasing, which will make an additional demand for good riding horses. In starting a breeding establishment the maximum quality in foundation animals should be insisted upon. How often one hears of a beginner in the horse game purchasing a stallion that had little to commend him except that he could be secured for a low price. While the value of a horse is not necessarily determined entirely by the price it is nevertheless generally true.

It is a rare case indeed where a valuable animal, from the standpoint of breeding at least, is purchased far below the general market price. The type of person buying such a stallion would next, no doubt, shop

around and buy the lowest priced registered mare available, and then, with this start, expect to make money in breeding purebred horses. This just does not work out, in most instances, so great care should be exercised in the selection of foundation stock. It is always better to have one outstanding animal than three or four mediocre ones, for a good foal will out-sell three or four low-class ones, and the breeder has had the saving of maintaining only one mare instead of several.

Road to Ruin. It is very easy to get "horse-poor," and the quickest way to get into this predicament is to produce inferior horses. Sometimes a buyer may have an opportunity to buy a good mare at a fairly low price, which the owner had not taken good care of, or had not shown her produce. Such animals, of superior breeding and proper conformation, often are excellent buys, either as foundation brood-mares or for selling at a profit when put in condition. With a good foal at foot by an outstanding sire, the value is still further enhanced.

Lowgrade horses seldom make money for anyone. Don't be in the position of the party who tried to sell by saying that "outside of impaired vision, a swelling and a tendency to limp, this is a very fine horse." Or the fellow that had a buyer look at his mare on several occasions, receiving the final inquiry "Well, if she is such a good buy, how come she was not sold before now?" and his come back: "She would have sold had she been a better color." So, no color, no sale.

If one is in the purebred business, watch the trends in your particular breed. It is very easy for a breeder to get so "sold" on his own stock that he does not follow changes that have taken place in the breed. Popularity might indicate a change of type or bloodlines as being advisable, and the breeder must keep up with the times or he is apt to suffer financially.

Standing Stallions. One type of horse business that often has proven profitable is the standing of highclass stallions for public-service. Such stallions should not only be typical individuals of their breed, of the best bloodlines and conformation, but if possible should have been winners, as well as proven sires of winners. The value of a stallion is greatly increased when his get have proven their quality by their wins in the particular field for which they are bred. By the prestige so gained the stallion becomes more popular and as his fame increases, so will his bookings from outside mares.

Incidentally it might be said

that stud fees alone could probably bring in as much profit as that derived from any other avenue of the horse business. Even at the general minimum of $100 which is usually charged for registered stallions of the saddle breeds to registered mares, this amounts to a tidy sum at the end of the year, provided a reasonable number of mares are bred. Boarding mares bred to the stallion is also an additional source of income. The transportation of such mares can show profit, by using one's own equipment.

Training for the public is a phase of the horse business that has often been lucrative. There are so many types of training that a broad field is thereby covered. Experience is about all the capital required in securing a good income through training, but the ultimate success of such an enterprise will depend on turning out sufficient satisfactory "pupils" to build an excellent reputation for the operator. Training is often combined to advantage with horse breeding, with a boarding stable, a dude ranch, riding academy, and there appears to be a real need for high class trainers in many areas where riding is popular.

If possible, all the feed purchased should be secured at wholesale prices. Adequate storage facilities make this saving possible and are generally not too expensive. Horses should be grained only when necessary. One sees many horses entirely too fat, and in such cases the owner has been spending money for grain that has been absolutely wasted. This does not mean that horses should be allowed to get thin but there is a happy medium where the horses are in hard condition, with plenty of bloom and are still maintained at the minimum outlay for feed.

All expenses for feed, labor, can be charged off when figuring net income for tax purposes, and any breeding stock purchased for cash can be depreciated by at least 10% each year until the total amount is written off.

In shipping by rail, the half-rate on registered stock for breeding purposes applies to horses shipped by freight on practically all roads west of the Mississippi, and the saving made thereby might make it possible to sell to an out of state buyer at a delivered price and still show a profit.

Family Project. The horse business lends itself especially well to a family operation where at least one of the parents has sufficient interest or the proper background. Growing youngsters can take care of some of the chores, such as feeding. The older children having a talent

for such work could train some of the horses and the net income to the family would consequently be much greater than if hired help had to be used. This kind of setup would apply especially well where the children are of school age. It could be continued if the business expands sufficiently to take care of some of the young folks after they reach maturity. There are many cases where a family has done extremely well with horses.

Miracle Fiber Lasts 400 Years

The discovery high in the Andes of the ice-packed body of an Inca child, clad in wool and thought to be more than 400 years old, is another instance of the oft-repeated story of wool's ability to stand up over the centuries—strong, richly-colored, and beautifully preserved.

The mummified body of the young girl, believed to be a princess, is now in Santiago, under study by top-flight anthropologists, who regard it as a discovery of unqestionable importance. The child, about 10 years old, wears a black, sleeveless woolen robe, guanaco leather moccasins, and a silver headpiece and bracelets.

Her discovery recalls other cases in which wool garments, many hundreds of years old, have been found in tombs and mausoleums —their colors still rich and vivid, their structure still strong and their texture still soft.

Three years ago, when archaeologists at the American Museum of Natural History examined the previously unopened, mummified remains of an ancient Peruvian priest, they were impressed with the condition of the luxurious wool garments. Estimates of the age of this mummy varied from 1,200 to 3,000 years.

Utah Extension Service

Chickens Cause Swine Tuberculosis

Ninety percent of the cases of swine tuberculosis results from hogs coming in contact with infected poultry. Other infections come from cattle and humans.

In 1953, nearly 10,000 hogs were condemned at slaughter houses by Federal meat inspectors because of this disease. An estimated 36 percent of the swine herds and 14 percent of the pigs have tuberculosis. Most cases of the disease are picked up from poultry flocks mixed with young and old birds.

You can reduce the chances of your hogs getting the disease by raising an all-pullet flock, or by keeping old hens out of your hog lots and pastures.

The Poland China World

Can YOU Measure Your Farm in Dollars and Cents

Dick Seivers can. His dairy testing program lets him do it . . .

Condensed from Wyoming Roundup

MANY folks have a goal for their farm, but few have it measured in dollars and cents.

Dick Seivers, a dairy farmer near Powell, Wyoming figures his goal this way: He'd like to get a dollar a pound for butterfat; he knows it takes 3 acres per cow to produce the feed his cows need. So—he wants his herd to produce a 500-pound butterfat average in one year. That's $500 for every three acres on his place.

Herd Averages 400 Pounds A Year

Right now Dick's herd averages about 400 pounds. To raise that average 100 pounds will be quite a job. But maybe the Seivers' herd will be at that 500-pound average before you know it.

That's because Dick figures he's got a pretty good herd . . . one 2-year-old cow produced 396 pounds in one year; another cow, an 8-year-old, produced 550 pounds and a 9-year-old produced 544 pounds. Others in the 32-cow herd have test figures like 429, 468, and 449. Cows that tested low are going out of the herd, Seivers says.

Started Testing in 1953

Seivers started production testing in February 1953. He and other members of the association record monthly weight samples of the milk each herd cow produces and keep track of amount of concentrates and roughage and their cost.

Tabulations come up with figures like this: In one year Seivers had a feed cost per cow of $177.69 of which $102.04 was for roughage and $75.65 for concentrate.

He also had $350 profit above

Reprinted from Wyoming Roundup, Laramie, Wyoming

feed cost . . . a total value of produce or gross income of $16,946 . . . and a profit above feed cost on his producing herd of $11,-242.

Seivers and other Park County dairymen are sold on the program. Dick says a cow may not look as if she can produce, but when she has been tested, a dairyman will know for sure if she's any good.

Are Several Advantages

Nicholls adds other advantages. Lots of cows aren't even paying their feed bill, but if a dairyman tests his cows, he knows. . . if a person ever needs to sell out a tested herd, he can tell prospective buyers exactly what the herd has been producing.

But best of all, Seivers adds, "you know what you've got to feed your cows."

Has Two-Point Program

Here's the way he operates his feeding program:

1. He feeds silage—in the past he's fed 200-300 tons of alfalfa silage; this year he'll try making beet-top silage.

2. He feeds chopped green forage—when he switched from a pasture mix of bromegrass, orchardgrass, alta fescue, alfalfa, red clover, and a little ladino clover to Grimm alfalfa, production jumped 1½ pounds per cow. Bloat has been no big problem.

Last year Dick used mechanical harvesting on broadleaf trefoil and red clover and started harvesting his pasture and hauling it into his cattle late in June. He fed ⅓ of an acre a day with chopped hay, free choice.

Mrs. Seivers handles most of the work at milking time—twice a day at 4:30 in the morning and afternoon. She says, "That doesn't give us much time for belonging to organizations and going to town at night."

Dick is a member of the Big Horn Basin Artificial Breeding Association, a part of the Cache Valley Association. Despite the fact that he has a good sire, he thinks artificial breeding is fine "if we can make it work." He says progress is fine now.

Enough Insurance? Better Be Sure

Agricultural economists advise checking your liability insurance. There's a good chance, say the economists, that you're not protected well enough against legal risks in case of accidental injury to another person on your farm.

They point out that the heavy increase of power machinery on the farm has boosted the risk of injury to hired help or tenants. And there's increased chance of accidents on the highway. The farmer also has a responsibility to visitors on his farm.

Michigan Extension

COWS LIKE IT FRESH

These farmers get more pasture per acre with "rationed grazing" . . .

Condensed from The Ohio Farmer

Delmar E. Groves

LAST year in May, County Agent Marshall Whisler stopped to see Harold Owens, a good Medina County farmer near Lodi, Ohio. Harold described a new system of grazing he was trying.

"We're moving the fence every day," he said, "It won't be our fault if the cows don't get good pasture. But don't say anything about it until we see whether it works," he cautioned.

A week or so later when Whisler stopped at the Owens farm, Harold told him: "I had to change some of my ideas on that fence. Now I move the wire twice a day— found out the cows didn't like to go back on that same block of pasture after milking."

"Doesn't it take a lot of time?" asked Whisler.

"Only 15 or 20 minutes," replied Harold.

Questioned about scouring and bloat, Harold said: "Last year when I first tried this system, cows held up in body weight and did not scour as they do when given the run of a lush meadow pasture in the spring. They tend to eat all of the plants instead of picking out tender clover only."

With Brother-in-law George Lance and his father H. B. Owens, Harold farms around 300 acres. Only 40 acres of this land is near enough the barn to be used as pasture for their milking herd of 35 to 40 Holsteins. Part of this acreage is used for hay or silage—actually 16 acres would carry the herd under "rationed grazing."

At present, the Owens' are using an oblong-shaped meadow

Reprinted by permission from The Ohio Farmer, Cleveland, Ohio

for rationed grazing. A smooth electric fence wire is strung across the field on metal posts. While the herd is in the barn being milked one man moves the fence back another six feet or so to make fresh pasture available. If the cows eat it down, the fence is moved more often.

Harold says he prefers to use long narrow fields for rationed grazing. Much of the meadow acreage is divided into long strips by electric fence. Then during each milking the cross-wire is moved down the strip far enough to give the cows a fresh block of pasture.

The herd is left in one field for no more than seven or eight days because new growth will be hurt if kept in longer. They're not fenced away from the grazed section, yet they spend nearly all the time eating at the fresh block. If not moved entirely across a field before the eight-day period is up, the balance of that field or strip is cut for hay.

Meadows must be well-planned and cared for to withstand this use. It takes a good legume-grass mixture which is heavily fertilized. "There must be a good crop to ration—you can't ration something that doesn't exist," is the way Harold Owens put it.

Rationed grazing is also being used by brothers Robert and Raymond Griesheimer, Medina County Brown Swiss breeders. Under this system last year, they grazed 29 head of cows on 13 acres (in several fields). The herd is grazing an eight-year-old stand of alfalfa-bromegrass now under the rationed system. In this field, the fence wire must be moved back about 12 feet each time. Griesheimers would prefer to move it about six feet each time to avoid tramping of the grass.

Here's how they've made rationed grazing work this year. Early in May the herd was turned on a four-acre meadow mixture. The cows were allowed full run of the pasture and knocked it down in a hurry. At the end of a week they were moved to a five-acre piece which had been divided in half. After a few days on this they were ready to start rationed grazing on the other half of this five-acre field.

Reason for the open grazing early in the pasture season was to get enough second growth started for rationed grazing in late June after the first crop is gone.

A light-gauge copper wire is used to carry the current. It's strung about 32 inches high on steel posts 20-25 feet apart. This fence can be moved easily by one man in 10 to 15 minutes. After the cattle are moved to the next field, Griesheimers fertilize and clip the vacated field leaving clippings on the ground.

Producing Good Milk At Low Cost

HIGH-QUALITY milk can be produced with less than half the labor commonly used and with approximately half the investment commonly found in farm dairy buildings, according to results of a three-year case study conducted on several farms in the St. Louis milkshed.

This study was initiated by USDA and conducted under contract with the Doane Agricultural Service, Inc., St. Louis, Missouri. Representatives of the Illinois and Missouri experiment stations also helped develop work plans. The study sought answers to two major questions:

1. How do dairy buildings and equipment influence milk quality?

2. What's the most economical investment in labor, buildings, and equipment consistent with the production of high-quality milk?

In answer to the first question, the study strikingly revealed that production of good milk—once established by effective sanitation and cooling—isn't adversely affectd by use of low-cost buildings, labor-saving arrangements, or increase in herd size. Sanitation was achieved by such established practices as cleaning cows properly, cooling promptly and adequately, and using chemical and mechanical means for cleaning and maintaining equipment.

Answers to the second question were found in employment of the loose-housing system of dairy farming, better arrangement of buildings, and use of equipment designed to increase efficiency. New construction or remodeling was provided on test farms at a cost, based on 1950 prices, of about $200 per cow for the new dairy buildings and equipment needed for herds of 20 to 30 cows. This is little more than half the reproduction cost of conventional buildings and facilities commonly found on farms producing Grade A milk in the area.

Nine ordinary farms in the St. Louis milkshed were used for the test. Operators of some of them had not previously attempted to produce milk of a quality suitable for direct fluid consumption. New buildings and equip-

ment were installed step by step on three of the test farms. Buildings were extensively remodeled on four. On the remaining farms, two complete dairy systems were constructed at the beginning of the study.

Four additional farms on which Grade A milk was already being produced were used as controls.

Operators who followed recommended sanitation practices and used effective cooling systems, produced milk of sufficiently low bacterial count to meet Grade A standards.

On one test farm, for example, a change from hand milking to pipeline milking and from no mechanical cooling to spray cooling reduced bacteria count from above 500,000 per milliliter in 50 per cent of the samples to an acceptable level of 200,000 or less. In fact, the proportion of samples that tested under 20,000 bacterial count per milliliter on this farm compared favorably with that on one of the better control farms.

Labor studies indicated that as many as 225 hours per cow per year were spent on some of the experimental farms in the first year of the study. The average for six of the farms was about 155 hours. Changes made for the sake of efficiency reduced this chore labor to an average of about 58 hours per cow per year in the final months of the study.

Labor efficiency was improved mainly through ground-level storage of hay and silage, self-feeding, and direct movement of feed from storage to feeders; elevated stalls and means of bringing cows to the operator; rest-area arrangement and storage of bedding to reduce quantity used and labor involved; and use of a pipeline milker, spray cooler, water heater, and similar dairy equipment.

Other contributing factors were work routines to keep milker units in nearly constant operation at milking time and use of a preparation stall, in addition to two milking stalls, to get cows ready for milking.

Belief that loose-housing systems of dairy farming require large quantities of bedding was disproved by the study. Over a three-year-period on one of the farms, for example, only 475 pounds of bedding was used per cow per year. This was accomplished largely by eliminating cow traffic lanes and by feeding hay and silage at convenient distances from the resting area. From 35 to 50 square feet of space was available in the resting area and the cows were kept clean without difficulty.

From Agricultural Research

THEY OWN MACHINES IN PARTNERSHIP

Three Iowa farmers like owning a hay chopper and a baler in partnership . . .

Condensed from Wallace's Farmer and Iowa Homestead

JOINT ownership of big farm machinery has worked for three farmers in Hardin county, Iowa. They own a hay chopper and baler in partnership.

Capital investment is saved that way. And they save crops too, for custom operators are not always available when wanted.

It started back in 1941 when George Lee moved onto a farm he'd recently bought. He found that Floyd Lake, about two miles away, needed a hay chopper too. And Emory Lake, about two miles from each farmer, was interested in a partnership deal.

The three men bought a hay chopper outfit together. The arrangement worked so well that, in 1946, they traded the old machine on a new one.

Six years later, still satisfied, they traded again. This time they traded for a forage harvester with three heads—it will chop standing hay, hay in windrows and row crops.

"What's nice about this arrangement," says Lee, "is that you get the work done when you want it done."

Another nice thing is their cash lay-out. The last trade-in, 1952, cost the partners only $505 each.

Joint ownership covers the chopper and the blower. Each partner supplies his own hay wagon and tractors.

The partners don't spend much time or worry on detailed accounts. But they do have some simple adjustments for varying acreages.

"To make up the difference in acres," said Floyd Lake, "we start out having each one turn in a dollar for each acre of hay ground he has. We pay repairs out of this.

"Then at the end of the year we divide what is left equally among us. That way the man with larger acreage pays a larger share of operating costs."

How do they divide fuel costs?

Reprinted by permission from Wallaces' Farmer and Iowa Homestead, Des Moines, Iowa

"We always leave home with the tractor tanks full of gas," Floyd continued. "Then we refill at the place where we are working, and leave there with tanks full of gas."

What about labor exchange? They don't bother to keep accounts on that. Two men from each place just about make a crew. Lee usually has most hay, but he sends extra help.

In general, the three owners do not intend to do custom work. But pressure is strong, and sometimes they break over. When they do, the operator takes pay for his time and tractor out of the custom charge. The rest of the money earned is divided equally among the three.

This partnership didn't end with the forage chopper. They liked baled hay and straw too. So Floyd Lake and Lee bought a baler jointly.

Floyd Lake's cooperative arrangements extend in still another direction. Floyd owns a grain combine. A relative four miles away owns a corn picker. The relative picks Floyd's corn and Floyd combines the relative's grain.

"With the high speed road gear in your tractor," Floyd said, "it doesn't matter so much if the man you're trading with isn't right in your own neighborhood."

These men are happy with their partnership arrangements. But they are not looking for any more shareholders. They agreed that with any more they'd "be haying the year round."

Rumen Type Swine Rations

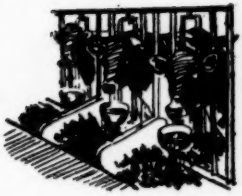
Predigesting or fermenting, rumen type rations may have possibilities for swine. At least one experiment gave favorable results from fermenting a corn, soybean meal, alfalfa meal, urea, and minerals ration for pigs. Fermenting was accomplished by stimulating the action in a cow's rumen. This processing probably will not help the better swine rations.

Among the forage crops, ladino clover is forging ahead both in feeding trials and in practice. Many stories have been told of the merits of ladino as swine pasture. It ranks high as a concentrate saver for the breeding herd.

Sow herds, particularly older sows, have been carried successfully through the summer gestation period on ladino with little or no grain. Even with excellent pasture it is recommended that bred gilts be allowed at least 1 pound of grain per 100 pounds live weight daily in addition to the pasture and minerals self-fed.

Better Farming Methods

He Dries Chopped Hay



Minnesota farmer finds that the longer chopped hay pieces are the better the cows like it . . .

Condensed from The Farmer

"YOU can cut hay at the best stage to save the most feeding value and get it in the barn in good shape."

That's the reason L. J. Praught, Wright County Minnesota gives for chopping and force-drying hay. He dries it in the barn without heat with a built-in fan, and has force-dried it in his semi-self-feeding hay shed using the air blast from his portable grain dryer.

Mr. Praught has worked out a system to make chopped hay more palatable to cows and to make the handling of it easier in the barn.

The longer the chopped hay pieces are the better cows like it, Mr. Praught has found. So he sets the chopper as coarse as possible and takes out two of the knives on the cylinder. "It's easier to blow air through the longer-chopped hay, too," he said.

To dry chopped hay in his 36x56-foot mow, Mr. Praught uses a fan of 18,000 cubic feet per minute capacity, powered by a 5-horse electric motor. This pushes air through an A-frame covered with heavy gauge wire mesh. The A-frame is nine feet wide at the bottom. It is constructed of two-by-fours, eight feet long.

But couldn't a power failure leave a barn full of wet hay and danger of a flash fire? Mr. Praught thought of that and installed an emergency air tunnel running across the mow floor from a side door and connecting at right angles to the A-frame. If electric power fails, he can pull his portable gasoline-powered drier to the outside end of this right-angle tun-

Reprinted by permission from The Farmer, St. Paul, Minnesota

nel and use the air-blast from it to keep the drying operation going. This emergency tunnel is of two-by-four framing covered with one-inch boards and tar paper.

In his 26x50-foot hay shed, Mr. Praught installed an A-frame 42 feet long. The frame is 8 feet wide at the bottom, and of two-by-fours seven feet long spaced two feet apart. The first eight feet of length of the A-frame is covered completely to direct the air-blast down the tunnel. Heavy one-quarter inch wire mesh covers the rest of the frame. The end panel is slotted. Air blast is provided by the fan on his portable dryer which delivers about 25,000 cubic feet per minute.

For either mow or hay shed drying, Mr. Praught wilts hay to about 30% moisture before blowing it in on top of the A-frame. As soon as the frames are covered he starts the air blast, and keeps it going while the shed or mow is filled and until the hay is dried. Hay dries from the inside out, gets wet and slippery on top of the pile just before it gets completely dry. Mr. Praught leaves the drier set up to take care of any "hot" spots that show for awhile after drying is completed.

Barn handling of chopped hay is made easy by four chutes running from mow to feeding alley in front of cows. There are two chutes on each side of the mow. Their top end is about level with the top of the hay pile. The chutes are open at top and bottom. Side panels are removable so that hay can be pitched into them without lifting as the pile is used "down." The chutes are filled once a day in the mow and hay is taken out at the feeding alley below as needed.

Cow Fertility Guesses Often Wrong

A recent survey by Dr. J. F. Bone, Oregon State college veterinarian, of dairy cows sold for slaughter because they were thought to be infertile revealed that one-third were pregnant and one-sixth had no diseases or abnormalities that would prevent them from becoming pregnant.

In other words, says Dr. Bone, about half the cows were needlessly slaughtered—they were fertile. Routine examination of herds has resulted in only about one-tenth of the cows being slaughtered that were potentially fertile.

Loss in production, in blood lines and in money from "guessing wrong" will more than repay veterinarian costs for examinations, Dr. Bone points out.

Oregon State College

How To Prevent Loss From Lightning

A Cornell authority gives valuable information concerning the protection of farm buildings . . .

Condensed from American Agriculturist
Paul R. Hoff, Cornell University

THIRTY seven per cent of fires in rural areas are caused by lightning. This is the greatest single cause of fires on farms and most of this loss could be prevented if buildings were properly protected by lightning rods.

The use of metal conductors to protect buildings from lightning started with Benjamin Franklin's kite experiment in 1732. Experience from that time until now has shown that good lightning rod equipment correctly applied provides excellent protection. Lightning rods have been used for many years and it is probable that more farm buildings are protected by them at present than in any time in the past.

What is Lightning?

Lightning occurs when charges of static electricity accumulate in the clouds and on the earth, including the surfaces of buildings, trees, animals, humans and other objects. Such charges always build up in pairs. As soon as an accumulation of one charge begins to form, another of the unlike kind will also start forming in a nearby region. The two unlike charges are attracted to each other and when the potential is large enough to move electricity through the air, a flash occurs and we see the visible lightning. If one charge is accumulating on the surface of a building and the opposite charge in a cloud, the stage is being set for the building to be struck by lightning.

There is no way of knowing when or where lightning will occur. The old superstition that "lightning never strikes in the same place twice" has definitely been disproven. Isolated buildings and tall objects such as trees, church steeples and silos are more vulnerable than are small, low objects or buildings in clusters. That is why there are more farm fires caused by

Reprinted by permission from American Agriculturist, Ithaca, New York

lightning than there are in villages and cities.

The purpose of lightning rods is to drain off the charge of static electricity accumulating on the surface of the building. A system of carefully placed rods (the industry calls them air terminals) and grounded conductors provides multiple paths for the accumulating charges to escape harmlessly into the ground. Air terminals must be located about 20 feet apart along the ridge of the roof and there must be an air terminal within 2 feet of each end of the ridge.

All protruding surfaces such as a roof dormer, a chimney or a silo must have separate air terminals. The air terminals must be connected together by suitable conductors which in turn are run down the sides of the building to good ground connections. Conductors must be run over the building in straight lines as far as possible, avoiding sharp bends. Abrupt changes in the direction of the conductor may cause arcing of the electric current across the short bends.

The combined system of air terminals connected to well grounded conductors drains the charge of static electricity that may be accumulating on the surface of the building, into the ground. By thus preventing a build-up of this static charge, there is no attraction of the opposite charge accumulating in a nearby cloud. Thus, the lightning rod system eliminates the condition under which lightning is likely to strike.

A lightning rod system can definitely protect the building on which it is installed, provided the system is correctly installed. A guarantee of correct installation is the Master Label that is issued by the Underwriters' Laboratories for buildings that are rodded to their specifications. These regulations specify how the rods shall be installed and they also require that all materials must have passed the Underwriters' inspection. The installation must be done by an official representative of the manufacturer who produced the material used.

Follow Instructions

Farm owners or home owners who plan to install their own lightning rod system can purchase Underwriter approved materials and can make the installation. For their own protection, they should follow instructions issued by the Underwriters' Laboratories or other authorities. Master Labels are not issued for owner-installed lightning rod systems, regardless of the excellence of the installation. Any possible reduction in insurance rates resulting from an owner installed system is not likely to result.

Lightning rod systems may be made of copper, aluminum, copper-clad steel or galvanized steel. Aluminum is recommended for application on aluminum roofs, since rapid corrosion is likely to occur if aluminum and some other metals, especially copper, come in contact with each other.

Reliable grounding requires that the ground connection be located in permanently moist earth. The metal that is in the earth must be a kind that resists corrosion and it must be as permanently connected to the conductor cable as possible. Copper, bronze or cast iron generally meet these specifications. There must be at least 2 ground connections for each building. Opposite corner locations are considered good, and many installers make a ground connection on each corner. The conductors should be continuous over the building between grounds.

All exterior metal parts of a building such as roofs, gutters, downspouts, etc. need to be connected into the ground system. **Metal roofs even with ground connections at all four corners but without air terminals are not adequate protection for the building.** The reason is that it is possible for a flash of lightning to puncture a metal roof and start a fire in combustible material beneath, even though the roof is connected to the ground.

Lightning sometimes damages buildings when it travels along fences that are attached to the buildings. This can be prevented by following two rules. (1) Do not attach a fence directly to a building. (2) Wire fences should be adequately grounded. Steel fence posts usually provide satisfactory grounds, but wire fences on wood posts need to be grounded at intervals of about 150 feet. A good ground may be had by driving a ½ or ¾ inch rod or pipe into the earth along side a wooden post.

The ground rod must go down to permanently moist earth if it is to be good protection. The top of the rod should extend a few inches above the top of the post and the fence wires can be attached to the ground rod with pipe straps. A well grounded fence is good insurance against loss of livestock as well as loss of adjacent buildings.

Inside the building, large metal systems such as the water pipes should be connected to the ground of the lightning conductor system. The connection is best made outside the foundation, although it can be made inside. If there is a water meter on the supply line, this connection must be made outside the meter. Metal cow stanchions, metal tie stalls, frames and metal pen partitions should be con-

nected with the water pipe system, and if any part of the stanchion system is within six feet of the down conductors of the lightning rod system, connected to that system also. Connections must be made with the same weight and kind of cable as is used in the down conductors. Hay carrier tracks must also be connected to the ground conductors at **both** ends. Door tracks and other large metal objects in or on the building also need to be grounded.

A lightning rod system is no better than the way it is maintained. It is possible that a system in poor condition is more hazard than no system at all. The conductor cables between the air terminals on the roof and the ground connections are the most vulnerable to damage. It is common to see loose, dangling ground cables that were broken when a tractor or a farm implement scraped the side of the building or to see the air terminals bent sideways as the result of the wind blowing a branch or some other object across the roof.

About the only maintenance that is required is the repairing of damaged ground conductors and straightening bent air terminals. This maintenance can mean the difference between having protection against lightning and no protection. A lightning rod system installed according to Underwriters' Laboratories specifications and given the Master Label of approval is excellent protection against lightning damage, but it must be kept in the original condition if it is to continue to give protection.

Nitrate tests of farm soils are of little value to farmers, according to Ray Linville, Ohio State University. He said nitrates and other soluble salts in farm fields vary with weather conditions. That makes accurate sampling difficult, and soil tests are accurate only when samples are taken correctly, he added.

Linville said nitrate tests are for greenhouses where soil and climatic conditions are controlled. The specialist advised farmers to use the standard test. It includes pH, lime requirement, phosphorus, potash and organic matter tests. Organic matter tests are a more accurate indication of available nitrogen than the nitrate test.

Optional tests for boron, manganese and magnesium are available. Linville said some farmers whose soybeans and alfalfa turn yellow use the optional test to see if these elements are needed.

Ohio State University

IRRIGATION AND BETTER PASTURES

Supplemental irrigation of dairy pastures brings good returns . . .

Condensed from The Agricultural Situation

MANY Dairy Farmers in Eastern United States may find it to their advantage to use supplemental irrigation in order to provide better pastures for their dairy cows. Even though there is usually enough rain to keep pastures growing throughout the season, a dry spell can greatly reduce grazing capacity which adversely affects feeding costs.

Being prepared to supply additional water when it is needed may prove to be good insurance against loss of pasture, during the hot, dry months of summer and fall . . . possibly save enough pasture in one or two dry years to pay the cost of irrigation equipment. Conditions for supplying irrigation water vary, of course, among different farms, and farmers will want to do some figuring before making a final decision.

If you are considering the possibility of installing irrigation equipment for your pastures, you will want to know what the irrigation is likely to cost. . . . Make certain the water supply is adequate, **even for severe drought;** and be sure the pasture treatment will support the practice of irrigation—**the right grasses, a good stand, enough fertilizer.**

Tests providing such information have been under way at Lewisburg, Tennessee, for the past 3 years. These tests, made cooperatively by the U. S. Department of Agriculture and the Tennessee Dairy Experiment Station, leave little doubt that supplemental irrigation for dairy cow pastures can be a worthwhile investment.

Returns $100 More Per Acre

In the Tennessee tests, returns from pastures that were irrigated averaged about $100 more per acre than similar pastures

Reprinted from The Agricultural Situation, U. S. Dept. of Agriculture, Washington, D. C.

that were unirrigated—after deducting costs of irrigation and other costs. The tests compared irrigated orchard grass, alfalfa, and ladino pasture with unirrigated. Annual applications of fertilizer and rotational grazing practices were the same for both irrigated and unirrigated pastures.

The average cost of irrigation (**labor, gasoline, oil, repairs and depreciation on irrigation equipment**) was $49.64 per acre, to provide nearly 20 inches of water during the season. Natural rainfall totaled an average of about 21 inches. After taking off the additional cost for irrigation and the value of feed, the irrigated plots produced an income of $388.78 per acre compared with $289.10 from the unirrigated plots. This was a net increase of $99.68 per acre in favor of irrigation. Figures are average results for the past 3 years.

Eighteen applications of water, a total of 24.3 inches, were made in 1951; **twelve** applications, totaling 14.8 inches, in 1952; and **nine** applications, totaling 20.7 inches, in 1953. This means an average of **thirteen** applications and an average total of 19.9 inches of water per season.

81 More Days Grazing

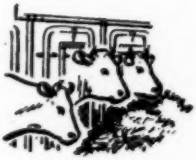
It was found that the irrigated plots provided 257 cow-days of grazing per acre against 176 days for the unirrigated plots. The irrigated plots produced 12,520 pounds of milk and 523 pounds of butterfat per acre against 8,019 pounds of milk and 354 pounds of butterfat. Digestible nutrients produced on the irrigated plots totaled 4,107 pounds per acre as against only 2,815 pounds per acre on the unirrigated plots.

"With all 3 years extremely dry, the advantages of pasture irrigation naturally show up sharply in this particular study," the scientists conducting the tests point out. "Pasture irrigation would seem to pay well, especially in extremely dry years, where costs of installing irrigation equipment are not too great, where the source of water is adequate, where sufficient fertilizer is used and good pasture management is practiced."

Recorders Shoo Birds — Scarecrows and tree covers may go out of fashion and be displaced by a phonograph—that is, if the modern machine will shoo the birds as some folks believe it will.

Pennsylvania State researchers showed that recordings of the distress call of the starling kept starlings away from an entire town for the rest of the season. The starlings' troubled call was played by tape recorder for 30 minutes each night for three nights.

Why Cows Lose Weight on Grass Silage



If silage is put up too wet there may not be half as much feed value per pound as in wilted silage . . .

Condensed from Hoard's Dairyman

W. R. Hesseltine

GRASS silage is being fed to more and more dairy cows each year. And where it is being fed, a larger portion of the daily intake of nutrients is coming from silage. Certainly this trend will save the most feed from each acre of forage.

Dairy farmers have learned a lot about how to put up grass silage. Oftentimes, however, the feeding of ensilaged forage has presented a feeding problem. Dairy farmers often complain about the herd losing weight when being fed large amounts of grass silage.

In regard to this particular matter, research workers at the Beltsville, Maryland, experiment station have a few facts that should interest every maker of grass silage.

But first of all, let's get a little better picture of what the problem is.

Corn silage, if ensiled in the late dough stage, is always quite consistent in moisture and digestible energy. Not so with grass silage. The stage of growth changes more rapidly in grass-legume crops. Thus, ensiling grasses and legumes presents a moisture content problem.

It is not unusual to see a crop being ensiled with 80 per cent moisture, and frequently forage is ensiled with 60 or 65 per cent moisture. A cow eating 80 pounds of 80 per cent moisture silage gets but 16 pounds of dry matter, whereas a cow eating 80 pounds of 60 per cent moisture silage gets 32 pounds or twice as much dry matter.

The situation is aggravated further since large amounts of grass silage are fed each day. Feeding 40 pounds of corn silage per cow per day used to be

Reprinted by permission from Hoard's Dairyman, Fort Atkinson, Wisconsin

thought of as being heavy on silage. Today, however, we think nothing of feeding 70 pounds of grass silage to a cow in a day. Thus, we seem to be depending more and more upon grass silage and less and less upon dry hay. And dry hay and corn silage are more consistent in both dry matter and digestible energy than is grass silage.

For these reasons it appears that there is a lot to learn about making and feeding grass silage, and the big problem is the moisture content in the crop.

In putting up grass silage, many dairymen have paid less and less attention to the moisture content of the crop since it is easier to cut the crop and put it right in the silo. With modern machinery, the added weight means very little as far as handling is concerned. But what about the cows? Will they eat as much dry matter in high moisture silage?

Mr. J. B. Shepherd and others at the U.S.D.A. Beltsville station studied the problem from 1950 to 1952. As seen from the following table, cows will eat considerably more dry matter per day from wilted silage and from non-wilted silage with dry concentrate added as a means of taking up the excess moisture. The absence of wilting in a high moisture crop, therefore, decreases dry matter intake by the cow. Thus, high moisture silage is likely to cause loss of weight.

A moisture content of approximately 68 to 70 per cent appears to be ideal from the standpoint of proper preservation of the crop. If the crop is put in right after cutting when the moisture content is high, the addition of a material such as citrus meal or pulp would appear to be practical.

The use of the chemical sodium bisulfite as a preservative eliminates the choice of wilting the crop. The forage should be put in immediately when using this material since all the moisture is needed for proper chemical reaction.

The oldest rule in making grass silage is "better to have it too wet than too dry." Now it seems as though the rule should be "get the moisture content down to about 70 per cent." This enables the cow to eat more dry matter and yet isn't dry enough to cause mold if packed at all well. This rule, of course, does not apply if chemicals are used.

How can we estimate this amount of moisture in silage? There are several ways, but the "grab test" seems to be quickest, easiest, and is quite reliable after a little practice.

Perhaps it would be well to repeat. The crop should be cut fine, say ¼ to ⅜ of an inch long. A handful of the silage

is packed between the hands in snow-ball fashion and held for 20 to 30 seconds. When the pressure is released, the ball should fall apart slowly. There should be no free juice.

Wilting the entire crop to a desirable moisture content is almost impossible. However, with a little practice and the use of good judgment in the amount cut ahead, one can get the crop in at about the right stage of moisture. Certainly some will be on the wet side, and some a little dry, but the amount of error can be kept small with a little practice and planning.

The result should be minimum spoilage and greater dry matter intake by the herd when feeding.

HOW COWS ATE SILAGE

Crop Harvested	% Moisture Content of Silage	Lbs. Dry Matter Eaten Daily per 100 Lbs. of Live Wt.	Lbs. Dry Matter Eaten Daily By a 1,200-lb. Cow
Orchard grass:			
First cutting (boot stage):			
Fresh green	79.7	1.36	16.3
Wilted	66.9	2.00	24.0
Second cutting (early hay stage)			
Fresh green	71.8	2.08	25.0
Fresh green + 5% dry grain	69.7	2.21	26.5
Wilted	59.5	2.11	25.3
Alfalfa:			
First cutting (1/10 to ¼ bloom):			
Fresh green	77.9	1.23	14.8
Wilted	72.7	1.94	23.3
Wilted	65.6	2.34	28.1
Half-dry (Gas-tight silo)	45.7	2.52	30.2

Relation between the moisture content of silage and the amount of silage dry matter consumed by dairy cows at Beltsville Experiment Station.

SILAGE GRAB TEST DATA

Conditions of Forage Ball	Approximate Moisture Content
Free juice; the ball holds its shape	over 75 %
Little free juice; ball holds its shape	70 to 75%
No free juice; ball falls apart slowly	60 to 70%
Ball falls apart quickly (too dry)	below 60 %

LET THE WATER DO THE RUNNING

A modern, pressure water system has many advantages on the poultry farm . . .

Condensed from Poultry Tribune

Milton R. Dunk

RUNNING water is a must on the modern poultry farm.

One hundred hens will consume 4 to 5 gallons of water a day. That might not seem like very much water, but in a year's time it would amount to seven and one half tons. If you had 1,000 layers, they would require about 75 tons of water a year. And that's a lot of water if you had to carry it in a bucket.

According to a study at the University of Missouri, automatic waterers reduced the hours of labor required in watering 100 hens from 41.5 hours to 1.7 hours a year. Other studies have shown that poultrymen with running water in their laying houses spend less than one minute per day to water 1,000 hens, while the poultrymen without running water spend nearly one hour each day watering 1,000 layers.

Hens require plenty of fresh water in order to maintain top egg production. Nothing cuts growth efficiency of broilers and turkeys as quickly as a shortage of water.

Running water under pressure has completely revolutionized living on the farm. With a pump and storage tank to circulate the water to the various faucets in the home and around the farm, the entire family enjoys better health and greater convenience and enjoyment of the daily living.

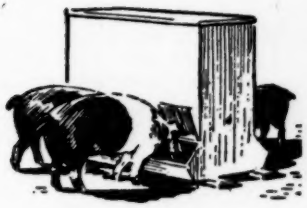
A completely equipped water system means a well, an electric pump, usually a pressure storage tank, and piping to circulate the water to as many outlets as desired in the farm buildings and in the farm home.

The installation of a modern water system can be planned in different stages. This makes it easier on the budget. First, the well, pump, and storage tank. The piping can be installed first to service the most essential outlets.

Reprinted by permission from Poultry Tribune, Mt. Morris Illinois

Better Swine Management

Here are 15 recommendations for growing and fattening swine . . .



Condensed from Hog Breeder

Fifteen standardized management recommendations for the growing and fattening of swine from weaning-to-market age that will be helpful to hog farmers in all 48 states have been released by the Nutrition Council of the American Feed Manufacturers Association.

Chairman of the Council, Dr. Victor Heiman, stated, "These recommendations are the result of a long, intensive study of all available research data and management recommendations issued by land grant colleges, experiment stations, the U. S. Department of Agriculture, feed manufacturing companies, and other interested parties. The Survey Committee has carried out a thorough survey, and modified the recommendations to comply with majority thinking."

The AFMA Nutrition Council, composed of research men from 61 feed manufacturing companies, has worked since July, 1952 to arrive at a set of standardized recommendations which could be used equally well in all 48 states.

Dr. Heiman continued, "These recommendations for swine represent one phase of the Council's long range program to bring more uniformity in management recommendations for all classes of livestock and poultry.

The fifteen suggestions for growing and fattening swine are as follows:

Feeding Management

1. The number of pigs per linear foot of self-feeder space or pigs per self-feeder hole should be:

	On Dry Lot	On Pasture
Weaning to 75 lbs.	4	3-4
76 lbs. to market	3	3-4

(A ten-foot self-feeder open to pigs on both sides provides 20 linear feet of feeding space.)

2. The percentage of self-feed-

Reprinted by permission from Hog Breeder, Chicago, Illinois

er space given to protein supplement should be:

	On Dry Lot	On Pasture
Weaning to 75 lbs.	25%	20-25%
76 lbs. to 125 lbs.	20%	15-20%
126 lbs. to Market	15%	10-15%

3. Three self-feeder holes, or three linear feet of mineral box space, should be alloted for 100 pigs when salt or a mineral mixture is fed free-choice.

4. For hand feeding in troughs, or for hand watering, the length of the trough per pig should be:

Weaning to 75 lbs.	.75 ft.
76 lbs to 125 lbs.	1.00 ft.
126 lbs. to Market	1.25 ft.

(A ten-foot trough is considered to provide ten feet of feeder space whether pigs eat from one or both sides.)

5. When pigs are confined from weaning to market, 15 sq. ft. of feeding floor space should be provided per pig if the pigs are fed from troughs and 10 sq. ft. of feeding floor space if fed from self-feeders. This is in addition to sleeping space.

6. One automatic watering cup should be provided each 20 pigs. (an automatic waterer with 2 openings should be considered 2 cups.)

7. The minimum capacity waterer for 10 pigs per day should be 25 gallons in the summer time and 15 gallons in the winter time.

8. The drinking water should not fall below a temperature of 35 to 40 degrees Fahrenheit during the winter.

General Management

9. The area of shelter provided should be:

	Summer Time (Shade or Housing)	Winter Time (Housing)
Weaning to 76 lbs.	7 sq. ft.	6 sq.ft.
76 lbs. to 125 lbs.	9 sq. ft.	8 sq. ft.
126 lbs. to Market	12 sq. ft.	10 sq. ft.

10. The use of sanitary hog wallows during hot weather is recommended. Up to 50 pigs can be accommodated per 100 sq. ft. of wallow providing shade or shelter is near-by.

11. Ringing of pigs is recommended where rooting becomes a problem.

12. A program of strict sanitation to prevent infestation is recommended for control of round worms in swine. Where such a program is not effectively carried out, worming of pigs soon after weaning, and repeated later if needed, is recommended.

13. Effective mange and lice treatment is recommended at weaning and whenever needed thereafter.

14. On good legume or legume-grass pasture allow 20

growing-fattening pigs per acre on a full feeding program and 10 to 15 per acre on a limited-feeting program.

15. Pigs of widely varying weights should not be run together. It is recommended that the range in weight should not exceed 20 per cent above or below the average.

Early Development A Must

By Karl B. Musser

How you handle calves may be a major factor in the success of your dairy herd.

Recently we visited a large herd in which there seemed to be lacking a thriftiness in the calves. One look at the tails was evidence that tremendous disadvantage was being placed on the calves by feeding a ration that scoured the youngsters to the point of emaciation. We found them deprived of all roughage except bright green alfalfa hay. While alfalfa is one of the dairyman's best roughages, it is not suitable for best calf growth—young calves scour with it.

In a similar case we suggested a change to some other roughage, in this instance prairie hay. It worked wonders in the calf herd. In another, oat hay proved satisfactory, and in still another, the much-maligned timothy hay was the solution. We do not expect our young children to share the hearty so-called heavy food that elders eat, so why should we expect young calves to handle the heavy protein roughages that are fed to mature cows?

A well-grown youngster in the herd is the first step to utilization of those basic things we seek in trying to build a more profitable herd. The cheapest, fastest and most gratifying development of dairy animals is in the early part of their lives. The right kind of good roughage has no peer in accomplishing this.

Guernsey Breeder's Journal

A Chicken Can Check Your Silo — Let a chicken tell you if your silo is safe. That's the advice of Stan Witzel, Wisconsin agricultural engineer.

Silos can have dangerous gases in them if the doors have been closed and some silage has been left, Witzel warns. Just to be on the safe side, let a live chicken stay in the silo for an hour or so before you try it yourself. If the chicken dies, air the silo out by opening it up as much as possible. The blower from the silo filler can be used to bring in fresh air.

Putting on 20 lbs. per Lamb

North Dakota feeders have worked out a successful formula for fattening lambs . . .

Condensed from Breeder's Gazette

Owen W. Hock

IN 1916 H. K. Balthauser and Art Moyer went into partnership to feed lambs at Glendive, Mont. Twenty years later they moved to West Fargo, N.D., where they have a 12,000-lamb feedlot.

"We used to do almost everything with horses," explained genial Art Moyer, active part-owner of the outfit. "Then we tried a wheel tractor, but it got stuck during wet months. So we bought a Caterpillar HT4 Shovel; it fits our operations perfectly. We use it to pull feed bunks through the muddy lots, clear snow around the place after a blizzard, move grain and clean manure from the feedlots each summer. We even use that tractor to haul bales of hay and to lift those 250 to 400-pound sacks of wool onto the truck."

The Balthauser & Moyer lambs are purchased at from 80 to 90 pounds and fed out to 100 to 110. Both black-faced and white-faced lambs are fed. When weather permits, usually the latter part of February or in March, special purchases are made of lambs for shearing. As white-faced lambs furnish the finer wool, these are the ones picked mostly for shearing.

North Dakota winters can be severe and care has to be taken with lambs that have been sheared. "We find," says Art Moyer, "that by turning a number of shorn lambs in with an equal number of unshorn ones, we can prevent bunching. Each shorn lamb has a natural tendency to crowd between two lambs that still have their wool."

They have portable bunks

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the bunk is pulled into a barn and under a grinder hopper. The grinder is fed grain from an auger on one side and alfalfa from an elevator on the other side. The feed mixture is controlled by decreasing or increasing the speed of the auger or elevator. Each bunk is filled with a predetermined mixture of feed and then pulled to its respective lot, while another bunk is brought in to be filled.

Hay is stacked on one side of the barn and grain stored on the other, with the grinder in the middle. The grain is pulled in from the pile by the auger and the baled hay can be placed on the elevator by one man.

Feedlot operations are carried on for 10 months of the year. June and July are set aside as cleanup months, when the manure is piled up with the tractor-shovel in the feedlots. Farmers in the area may obtain the manure free; they don't even have

lambs on a 3-day diet of ... hay and then at the end of the 3 days check for gaunt lambs. These are poured full of water and then all are vaccinated for overeating.

"I consider vaccination for overeating one of the most important precautions in lamb feeding," emphasized Art Moyer. "Although it's not 100% sure, it does cut down considerably on losses." Moyer figures his death loss averages 1½ to 2% per year, but adds that it could easily run as high as 4% if they didn't vaccinate.

After the three-day introduction, the lambs are moved into a lot and fed from self-feeders on a ration of from 15 to 20% grain mixed with chopped alfalfa. With each filling of the bunk (every 3 days) the grain is increased until 50-50 combination of grain and alfalfa is reached. The lambs are left on this ration until fat—usually 60 to 65 days.

— Art Moyer went into partnership to feed lambs at Glendive, Mont. Twenty years later they moved to West Fargo, N.D., where they have a 12,000-lamb feedlot.

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They have portable bunks

Reprinted by permission from Breeders Gazette, Spencer, Indiana

that can be pulled behind the tractor. The bunks are 16 feet long, hold many bushels of feed and are mounted on old locomotive boiler flues. One bunk will feed 150 lambs at starting weight and 100 lambs at finishing weight for three days. Each bunk is roofed to keep out snow and rain.

Filling these bunks is a relatively simple operation. A chain connected to the boiler-flue runners is hooked to the Cat and the bunk is pulled into a barn and under a grinder hopper. The grinder is fed grain from an auger on one side and alfalfa from an elevator on the other side. The feed mixture is controlled by decreasing or increasing the speed of the auger or elevator. Each bunk is filled with a predetermined mixture of feed and then pulled to its respective lot, while another bunk is brought in to be filled.

Hay is stacked on one side of the barn and grain stored on the other, with the grinder in the middle. The grain is pulled in from the pile by the auger and the baled hay can be placed on the elevator by one man.

Feedlot operations are carried on for 10 months of the year. June and July are set aside as cleanup months, when the manure is piled up with the tractor-shovel in the feedlots. Farmers in the area may obtain the manure free; they don't even have to load their wagons or spreaders; the HT4 does it. Lately they have been piling up the manure for a year to give the lambs a high, dry place to stand on during wet, muddy weather. So now the farmers get their fertilizer from year-old stacks, while new ones are being built up.

As soon as they arrive, the lambs are tested for intestinal parasites; treated only if they are infected. They start the lambs on a 3-day diet of wild hay and then at the end of the 3 days check for gaunt lambs. These are poured full of water and then all are vaccinated for overeating.

"I consider vaccination for overeating one of the most important precautions in lamb feeding," emphasized Art Moyer. "Although it's not 100% sure, it does cut down considerably on losses." Moyer figures his death loss averages 1½ to 2% per year, but adds that it could easily run as high as 4% if they didn't vaccinate.

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Another idea: they size the lambs so that the peewees are not crowded away from the feed.

Salt, bicarbonate of soda and steamed bonemeal are among the minerals fed the lambs during fattening. Mr. Moyer feeds molasses whenever price permits. He goes on the basis that 6½ gallons of molasses equals one bushel of corn in food value, but says the lack of standardization of quality for molasses is a disadvantage.

If there is one type of feed Moyer firmly believes in, it's siloed grain. "It increases the conversion value of grain by as much as 20% and the lambs can handle it more effectively because the digestive process has already been started," he explains. "It's not too hard to handle," he adds. "I can get a pretty complete siloing process started in 15 days."

Balthauser & Moyer have realized considerable savings on grain purchases by taking wet grain. They bought 118 carloads of grain that had been soaked in the Kansas City flood. "It had already been partly siloed," Moyer related. "We only lost 75 bushels of the entire lot due to spoilage."

Lambs also have less tendency to overeat, or founder, on siloed grain, Moyer believes. They have little spoilage. Of course, the basic feed is alfalfa. The first cutting is the best, they think. It is fed chopped.

Most of the lambs are purchased at the Union Stockyards, neighboring on the south. They also sell the lambs at the same place where six packers have their buyers.

The Balthauser & Moyer lamb fattening operations aren't limited to the West Fargo feedlot. They have 7,500 lambs grazing on winter wheat on the western Kansas plains, and 10,000 more are feeding on Ladino clover and alfalfa near Brawley, Cal. In both the other locations they field graze entirely, until the lambs are fat enough to be shipped to market.

Cash Value of Corn Silage — The amount of corn grain in well-eared silage is about 4 bushels per ton, and the total digestible nutrient content of the stalk portion of one ton of silage is equivalent to about 340 pounds of mixed hay. A common method of arriving at the price of corn silage is to rate it at one-third the local price of legume hay on the farm.

Silage made from well matured corn will be 25 to 35 per cent higher in total digestible nutrients and dry matter than silage made from immature corn.

He Made the "Poor Farm" Pay

Soil-building terraces, gully control, legumes and fertilizer restore a Nebraska farm to production and profit. . .

Condensed from Nebraska Farmer

Tom Leadley

FOR 49 years a quarter section farm south of Greenwood in Cass County, Nebraska, was known as the "poor farm" because of its rundown, unprofitable condition. Then under new ownership and a sensible, sound soil building plan, it began to return a profit.

Now after 10 years of approved farming methods, it is one of the most productive and profitable farms in the community. In 1952, the gross income from the farm was more than its original cost. This is the story of what approved soil conservation practices did to rebuild that rundown farm.

The story stems from the conviction of John G. Armstrong, that farms become unprofitable from poor farming practices, primarily neglect of the soil. Scouting in 1943 for a good buy in farms, Armstrong found one in Cass county known as the "poor farm" or poverty farm. It had been so classified by neighbors since 1894. The land was rolling, rough and gullied from unchecked erosion and much of it was abandoned for crop production.

Against the advice of his friends, Armstrong bought the farm for $62 an acre. A loan on the farm had been foreclosed and he made the purchase from the insurance company. Possibly he was sick of his bargain the first year because he resold the farm. But some defect in the title killed this sale so he had to take it back. Now he is glad he did.

When Armstrong bought the place a soil conservation survey showed only 99 acres of land suitable for farming. He checked some soil maps and found that the soil was basically all right so he began to map out a soil and

Reprinted by permission from Nebraska Farmer, Lincoln, Nebraska

crop improvement program. First of all, he experienced a headache in finding a suitable renter. Prospects had heard about the place and shied away from it. He tried three different renters the first year until he found one who would stick.

In the first year of operation under Armstrong's ownership the tenant raised $360 worth of crops from the farm of which Armstrong received $160 for his share. This was barely enough to pay the taxes. The next year all crops were a failure. In the third year, all 99 acres of the cultivated land were in wheat from which Armstrong received $1,000 as his share. The farm was on the way up in production and profit. Let's see what was responsible.

The first step in a better farming program was to fill and smooth the gullies with a bulldozer and to install small check dams to retard water run-off in the waterways. The farm had many small trees scattered over the place and some of these were removed and placed in the gullies as the foundation for check dams.

Some alfalfa was seeded and Armstrong received two tons of hay from the 10 acres as his share the first year, but the crop was mostly weeds and sandburrs. The unused land was in sunflowers, ditches and gullies, some almost a wilderness. In fact, an old corncrib located on the farm could scarcely be seen in the wilderness of tall weeds.

In 1946, Armstrong called in the Soil Conservation Service to make a survey for erosion control. The technicians laid out some lines for contour farming. They told him to follow a program of contouring with check dams and later the land could be terraced.

Beginning in 1947, Armstrong began a sweet clover program, seeding as much as 75 acres per year for soil building purposes. Sweet clover was seeded with wheat in the spring and plowed under that fall and the land put in corn the following spring.

The corn began to yield better but the fields still had too many gullies for convenient farming and for effective erosion control. In due time the terraces were built totalling several miles under Soil Conservation Service direction, and in the meantime corn yields had climbed to 75 bushels per acre in 1950.

Last year despite an unusually dry season the corn on the farm averaged about 65 bushels with top yields near the 75 bushel mark. The corn was grown on land previously in sweet clover and with a 21 percent nitrogen fertilizer added. Last year's wheat crop on clover ground yielded 32 bushels after some hail damage but without commercial fertilizer. Wheat grown

in 1952 with commercial fertilizer added yielded 32 bushels per acre.

Armstrong's rotation plan is to keep the land in corn about two years, then two years of wheat, followed with sweet clover or alfalfa. The farm now has 25 acres of alfalfa; 15 acres of sweet clover were plowed under last fall. There is no pasture nor is any livestock kept on the farm.

The out-of-pocket cost in this soil improvement program has been about $4,200, Armstrong estimates, which included $1,300 for a bridge across a creek which separates a small productive corner of the farm and was difficult to reach without a bridge. All told, he has an investment of about $100 an acre in the land now. His net return in 1953 will be about 25 percent on that investment. As previously mentioned, in 1952 the gross income from the farm was more than its original cost.

One significant result in increased yields came from the application of lime after a soil analysis showed a lime deficiency. It increased yields on both alfalfa and corn.

The lime cost $3.90 a ton spread. It will last seven to 10 years on the alfalfa field, Armstrong thinks. His alfalfa is of the Ranger variety, seeded with certified seed which is well worth the extra premium, Armstrong says.

On another nearby farm owned by Armstrong, lime has been used effectively for corn. Its use increased the yield 10 to 15 bushels per acre above the untreated field, and the corn seemed to stand the drouth much better and to remain green. Both fields had the same amount of nitrogen fertilizer.

In addition to nitrogen fertilizer and lime, he hired a commercial trucker to haul some 1,700 tons of manure from an old feed yard and put on fields on the other farm. His tenant spread the manure. The cost was a little more than $2 a ton on the land. This was put on in the fall of 1952 on fields seeded to wheat. The succeeding crop was good but badly hailed. The manured land is now full of humus and looks like new soil while that not manured is heavy and cloddy.

A chemical weed spray, 2,4-D, is used on corn every year where fields are badly infested with weeds. The spray is applied after the last cultivation. Roadsides and waterways are also sprayed for weed control. The worst weeds are sunflowers, bindweed and buttonweed. He also has used the more powerful chemical, 2-4,5-T, on brush and small trees.

Both the "poor farm" and the other nearby farm owned by Armstrong have been farmed by tenants Ralph Burhopp and Lloyd Waddle for four years on

a share basis. The owner receives two-fifths rent on grain and one-half on alfalfa, the owner paying for the baling. The cost of fertilizer is divided on the same basis as crops and the owner has paid all the costs of hauling the manure.

Now after ten years of operation, the "poor farm" has 152 acres in cultivation. In 1953, the Soil Conservation Service surveyor told him he had obtained more soil improvement on his farm than on any other farm in Cass county.

Mr. Armstrong is happy about the whole thing. What he did he says others can do also, and he is always glad to tell others how he did it.

Need More Sheep, Fewer Cattle

Larger farm sheep flocks may be a partial answer to lower dairy prices. F. J. Giesler, Wisconsin animal husbandman, points out that wool prices are on the way up. And he predicts they will stay high.

Mutton, the other product from a sheep flock, is also in good demand. Giesler says that over the years lamb prices have always been good. They haven't fluctuated as much as beef and pork prices. Lambs can be sold directly off pasture at top market prices.

Dairy farmers don't have to change cropping practices to increase sheep flocks. Sheep make good use of roughage—work in well with grassland farming. And they can be fed a simple home-grown grain ration for milk production.

The big fault with many sheep flocks today is that they are too small to pay their way, says Giesler. They are kept around merely to clean up fence rows. Giesler recommends increasing the farm flock to at least 35 breeding sheep. Make the flock big enough so it will pay to do a good job. In net income five sheep will return roughly the same as one dairy cow.

University of Wisconsin

United States Lamb Crop of 1954 totaled 20,170,000 head, 3 per cent larger than the 19,600,000 head raised in 1953 according to the Crop Reporting Board. This is the fourth successive increase over the preceding year since the record low lamb crop of 1950. Although 13 per cent above the 1950 low, the lamb crop is still 10 per cent below the 10-year average. In 13 western States (11 Western, South Dakota and Texas), the lamb crop is 4 per cent larger than last year. Texas, the leading sheep State, has an 11 per cent larger lamb crop than in 1953.

Costs of Producing Maple Syrup

If you have a sugar bush or are thinking about one, read this account of a Wisconsin survey . . .

Condensed from a Wisconsin Circular

F. B. Trenk and P. E. McNall

NEED to know the cost of producing syrup was discussed at meetings held in the important maple syrup producing counties of Wisconsin during the winters of 1951 and '52. What does it cost to produce a gallon of syrup and what variation in costs is found among neighboring producers? Can producers find out what makes for lower costs of production and how important to costs are such items as labor, containers, type of fuel used and extent of the sugar bush?

Twenty-four producers volunteered to keep the records needed for the study but only sixteen usable records were turned in. These 16 producers produce approximately 4 percent of the total maple syrup production of the state.

Average Investment Not High

The average investment in land, sap house and syrup making equipment was $3,647. The range in investment was quite large, however, and indicated one of the reasons for the variation in costs shown later.

An average of 695 trees per bush was tapped in the spring of 1953. This represents 23 trees tapped per acre. These trees produced 194 gallons of syrup per bush from 941 buckets or an average of 20.6 gallons syrup per 100 buckets hung. More specifically each tree produced .28 gallons of finished syrup in comparison with the state average of .23 gallon.

Costs Vary Greatly

Total costs of producing maple syrup ranged from $3.52 per gallon to $19.37—the average being $4.80 per gallon. These costs may be divided into three groups. Fixed costs account for $1.58 of the total. They include the cost of the investment in the maple bush, the equipment necessary, and insurance.

The allowance for the use of the sugar bush comprises two elements—taxes and a rental fig-

Reprinted from Costs of Producing Maple Syrup in Wisconsin, Agricultural Experiment Station, Madison, Wisconsin

ure for the land. Since most syrup producers may now use the Wisconsin farm woodland tax law which provides for a yearly tax of 20 cents per acre, this figure was used as a tax rate for every bush. This is about 10 cents an acre less than the average paid by these cooperators.

Rent for the bush was figured at 5 percent of the estimated value of the bush. This amounted to 11 cents per bucket hung. This is in line with rental charges in the Eastern states where larger quantities of syrup and sugar are produced.

The combined cost of rent and taxes was 57 cents per gallon of syrup while the total cost of all fixed items, including insurance on buildings and men was the $1.58 per gallon mentioned above. Fixed costs by groups, however, varied from a high of $3.79 to the low of $.48.

The second series of costs, include labor, power, machinery costs and fuel. These items amount to an average $2.91 per gallon of syrup produced but varied between $4.30 and $1.71.

What makes for the wide range in costs? Is it to be found in the variable costs of labor, power and fuel, or is it in the fixed costs of buildings, bush and equipment? Every step in the production of syrup represents potential opportunities for reducing production costs, whether it be in the use of labor or in the valuation of the bush.

Labor Costs Largest Item

Labor costs, representing 45 percent of the total costs, are distributed over every operation of the bush. Seventy percent of the labor is used in gathering sap and boiling it down. The next item of importance is the clean-up before sap begins to run. A little less than 10 percent of the total labor is used here. The remaining 20 percent is divided among the four operations of tapping the trees, hanging pails, gathering sap and getting fuel.

There were six of the sixteen producers whose labor costs were $2.50 or more per gallon of syrup produced. Five of these six were among the highest total cost groups. On the other hand, five of the six bushes which showed the lowest labor costs also showed the lowest total costs per gallon of syrup. No other factor had as much effect on the total costs as the amount of labor used in making the syrup.

There was little in the records to account for the variation in labor costs and in its relation to total costs. The six operators showing the largest labor costs averaged 18 acres of bush and tapped 30 trees per acre. The sap house was in the bush in each instance and the average distance from the sap house to the farm house was 7 miles. They all made wood and averaged 40

hours per bush in this operation.

The six operators with the lowest labor costs average 21 acres of bush and tapped 34 trees per acre. The sap house also was in the bush and the distance from the sap house to the farm house was the same as for the high labor cost group with the exception of one man whose sap house was 10 miles from the farm home. Only three of these men spent time in preparing fuel for evaporating the sap and they averaged 60 hours per bush. Two of the remaining low cost producers used oil and the third man apparently used previously prepared supplies of wood.

Horse, Tractor and Truck Costs

These items vary in amount because of such things as the volume of snow which must be cleaned from the main trails, the length of haul, the topography of the land and the sweetness of the sap which determines the quantity of wood that must be supplied. Costs per gallon of these items ranged from 14 cents to 66 cents. One producer represents an extreme case in which a heavy, county-owned snow plow was employed to remove deep snow from the main trails throughout the bush. His costs came to the $1.63 per gallon.

Range in Fuel Costs

Fourteen of the sixteen producers used wood as the principal type of fuel for boiling down the sap. Two used oil and one used bottled gas under the finishing-off pan. The range in costs was from 12 cents per gallon of syrup to $1.49—the average being 45 cents per gallon. It is logical to expect that less fuel will be required to make a gallon of syrup from sap which yields 30 gallons of syrup from 100 buckets hung than from sap which yields 15 gallons.

Cost figures as supplied by the producers showed it cost the six producers with the largest quantity of syrup made from 100 gallons of sap 40 cents for fuel per gallon of syrup produced while the six with the least syrup per unit of sap required an average of 50 cents per gallon.

The amount of time required to reduce sap to syrup is dependent upon efficiency of the fuel used as well as the sugar content of the sap. The producers with the two oil burning evaporators required an average of 20 minutes of boiling to finish a gallon of syrup. One producer who used bottled gas under the finishing-off pan produced syrup at the rate of 18 minutes per gallon while the average of the cooperators was 44 minutes per gallon. Apparently the use of oil or bottled gas reduced the time of finishing off the syrup even though it did not result in low total costs.

Sap Concentration Had Little Effect on Total Costs

Apparently the sweetness of the sap or the amount of syrup produced from 100 gallons of maple sap had little effect upon total costs even though it required more fuel and time to reduce sap at some bushes than for others.

This study was not sufficiently detailed to answer questions regarding the sap concentration and flow. It does show that the amount of syrup produced varied from 8 gallons per 100 buckets hung to a high of 32 gallons. Studies made in Ohio, Pennsylvania, and New York have clearly shown that there is some continuing or inherent variation in the ability of individual trees to produce heavy sugared sap. There seems to be three factors which help account for the differences in individual trees. These are: the ratio of the height of the crown of the tree to the height of the tree, the ratio of the crown diameter to the total tree height, and the size of the tree.

This doubtlessly accounts for the low yield of a producer of 8 gallons of sap per 100 buckets. His stand is immature, tree diameters are small, ratio of crown length to total height is less than 50 percent and the tree crowns, due to crowding, are relatively narrow. The operator recognizes these shortcomings in his present bush, he is starting a program to cut out the poorest trees. When the thinning program is complete, he will be in a position to produce a better than average sugar bush because he is providing more crown space for the remaining trees than nature, unaided, would have done.

Larger Operators Show Lower Costs

When the operators are grouped according to the number of trees tapped they show that those with the greater number of buckets hung have slightly lower labor costs as well as total costs of producing syrup. The five men who hung more than 2,000 buckets had an average labor cost of $1.78 per gallon of syrup produced and a total cost of $4.04 per gallon. The six men with less than 500 buckets hung showed an average labor cost of $2.39 per gallon of syrup made and a total cost of $4.71.

Returns Per Hour Spent in Making Syrup

Just how much do producers get for their time if credit is allowed for all costs except labor? The returns range from -60c to $2.38 per hour. In other words, one producer failed to get anything for his time. In fact, his total costs except for labor were 60 cents per hour less than nothing. Most of the producers received between 50 cents and

$2.00 per hour while the average amount received was $1.11. This is a good wage for winter work but probably not very rewarding for the number of hours per day put in.

The producers who had the longer season, tapped more trees and received more for their time than did the producers with the shorter season. The six producers who worked their bushes more than 24 days during the season tapped an average of 785 trees and received $1.35 per hour. On the other hand, there were six producers whose season was not more than 20 days in length. They averaged 18 days run, tapped 696 trees and received 91c an hour for their work.

Dairy Breeds Vary Gestation

Dairy cows of different breeds vary in the length of time they carry their calves. But difference in breeds is just one of the factors influencing the length of the gestation period for a dairy cow, explains W. R. Van Sant, Arizona extension dairy specialist.

By knowing the average length of gestation for each dairy breed, a dairyman can figure a cow's freshening date more accurately than if he uses the general figure of 283 days. Ayrshires and Jerseys carry their calves for an average of 278 days, Holsteins—279 days, Guernseys—283 days, and Brown Swiss—288 days.

Heifers calving for the first time carry their calves two days less than older cows, on the average. A single calf is carried one to two days longer than twins; and a bull calf, one day longer than a heifer calf. Cows calving during the heat of the summer—July, August, or September—usually carry their calves for a shorter time than cows calving in the early spring. And, different bulls also influence the length of time a calf is carried.

Arizona Extension

Key To Quality Alfalfa Feed

After 5-years of experiments in havesting and preserving alfalfa for dairy cattle feed, researchers of the U. S. Department of Agriculture report that cutting the time between cutting and storing the alfalfa is the key to quality feed. Field curing is cheapest but makes for less quality than dehydrating, ensiling, or barn-curing. Dehydrating is fastest, but expensive. To the average dairy farmer in the semi-humid country, silage has much to recommend it. Silage ranks next to dehydration as the fastest and next to field curing as the cheapest method.

EIGHT STEPS TO PROFITABLE MEADOW PRODUCTION

Recent research shows ways to make legume-grass meadows more profitable . . .

Condensed from Ohio Farm and Home Research

HERE are eight practices—based on actual research findings—that will aid in making legume-grass meadows more profitable.

Forty years ago, Ohio farmers considered yields of from one to two tons an acre acceptable. Today, although state averages have not increased much, some farmers consider six or seven tons a desirable goal. Such yields are being attained rather often on the Station farms. The fact that it is possible, not only experimentally but on private farms as well, attests to the merits of good management.

The Trumbull County Experiment Farm is a good example of the results from rotations heavily weighted with productive meadows. A 26-cow Holstein herd at this farm has averaged 14,000 pounds of milk and 510 pounds of butterfat per cow for the last 4 years. That is nearly three times the present state-wide average.

On the credit side also is the fact that higher hay yields favor greater grain production. On heavy soils particularly, corn prospects are more favorable after several years of high-yielding meadows. Then, too, all of the corn can be harvested for grain instead of being either partially or entirely ensiled.

For long-lay meadows, the slight extra cost of wilt-resistant alfalfa seed will likely be returned many times over. Wilt develops slowly and becomes increasingly serious after the second year. Sometimes farmers mistake wilt symptoms for winter killing. But generally the trouble can be avoided by planting the resistant varieties.

Good meadows are especially necessary on dairy farms where

Reprinted from Ohio Farm and Home Research, Wooster, Ohio

grass silage, high quality hay and luxuriant pastures are necessary for economical and profitable milk production.

The soil conserving qualities of good meadows are well known. It might be wise to convert to almost complete grassland farming. Individual farms may even find this satisfactory in the more level areas.

1 Adapt Drill for Band Seeding

High on the list of profitable practices are those which aid the farmer in getting good stands of legumes and grasses. This applies particularly to alfalfa in straight seedings or in mixtures. The few dollars it takes to adapt drills for band seeding will pay off in seed saved and increased assurance of good stands. Individual plants get off to a vigorous start, thus enabling them to survive unfavorable conditions better than seedlings from the broadcast method.

2 Topdress with Phosphate and Potash

High yielding meadows require large amounts of minerals. A 5-ton crop of hay removes 50 pounds of phosphoric acid or the same amount as in 100 bushels of corn. A like quantity of hay removes 150 to 200 pounds of potash or 2 to 3 times as much as the small grains and several times as much as corn when the stalks are left on the field.

A low phosphoric acid fertilizer (12 per cent or less) at a low or moderate rate on small grains will fail to supply enough P^2O^5 for them and for one year of meadow. (250 lbs. 3-12-12 fertilizer contains 30 lbs. P^2O^5).

Higher analyses coupled with higher rates may still be inadequate for more than one meadow year. (400 lbs. 0-20-10 contains 80 lbs P^2O^5). The return of cornstalks and a reasonably good manure program will usually supply the potash needs of a 1-year meadow.

3 Make Consumption Equal Production

Meadows are most profitable when production is fairly well correlated with probable consumption. Large annual excesses to plow under are questionable. Barn capacity, farm size and labor supply are some of the factors that determine limits of meadow production on any farm. Because of the high investment needed for equipment, some farmers resort to custom work and cooperative effort among themselves to lessen each farm's machinery charge.

4 Spray for Crop-Damaging Insects

Insects take an unwarranted toll of forage crops each year.

Research has shown, however, that yields may increase one-half ton or more an acre for each spray used in the control of insects. Provided the evidence shows that the insects are in the field in sufficient quantities, first year meadows will benefit from spraying for spittlebugs. Likewise, control of leafhoppers on any age meadow where summer yellowing of alfalfa occurs will help make meadows more profitable.

5 Harvest Early

To bring the greatest return in feeding value, meadow grasses and legumes should be harvested before they have passed their peak of growth. To delay cutting too long deprives livestock of highly digestible nutrients which would be present more abundantly in choice early-cut forage. County agricultural agents can supply information on best harvest dates for the various grasses and legumes.

6 Rotate the Grazing

Rotation grazing utilizes forage more completely than continuous grazing and permits recovery between grazing. Alfalfa longevity is favored; better quality pasture is available daily for animals. More vigorous alfalfa offers greater "drought insurance" for summer pasture.

Rotation grazing becomes a more limiting factor. The more specialized the grazing, the more completely the forage is utilized.

7 Keep Soil at Near Neutrality

Long time tests have proved that inadequate liming is false economy. A soil reaction test of approximately pH 7.0 is quite satisfactory for most legume-grass meadows and pastures. Although there is little danger of overliming, you should know your soil. Take advantage of testing services, and when lime is needed consider it as a deposit toward good soil productivity.

8 Long-Lay Meadows Boost Yields

On farms where heavy forage production is a necessity, long-lay meadows increase the possibility of profit. The wide range of choice provided by alfalfa, alfalfa-grass, and alfalfa-Ladino-grass mixtures permits intensive grassland culture anywhere in Ohio. Red clover is less useful, as it is a biennial and largely disappears after one year of hay.

Yields of perennial meadow plants tend to increase in yield after the first year. Good management, and adequate fertilization are essential if these larger yields are to be maintained over a period of years.

Twin Crops in the Pines

Tree farmers of eastern Washington are proving that grass and trees can be companion crops on same managed acres . . .

Condensed from American Forests

Albert Arnst

IN eastern Washington, tree farmers are proving that grass and trees can be companion crops on the same managed acres. Harvesting prime cattle and sheep as well as sawlogs from forest lands is no longer a theory, says these practical-minded land managers. Both forage and timber can be grown as sustained-yield products "without getting in each other's way." The list of companies with successful range management programs proves that.

High on the list of tree farmers who have been doing pioneer work in teaming up grass and trees is the J. Neils Lumber Company.

"Our range management program has been considered very successful. We plan to continue it, because it has helped pay carrying charges on timber lands being held over for a second crop, as well as building up the forage resource."

That's the report from General Manager Walter Rathert, who helped initiate the project 14 years ago.

The J. Neils Lumber Co. contracts annual grazing rights on 97,584 acres to 20 permittees, who run 2591 cattle and 2160 sheep on designated grazing blocks.

During the development period this overall range improvement program called for expenditures totaling about $20,000. Approximately half of this amount was for fencing to control livestock "traffic," $3000 for reseeding of depleted ranges and $4500 for water development. Other expenses included a range rider's cabin, a portion of his salary and administrative costs. Tax payments are not included.

During the 14-year period income from grazing fees exceeded the range improvement and operating costs by about $40,000, an annual net return of approximately $2800 on the direct

Reprinted by permission from American Forests, Washington, D. C.

range program expenditures. This is a pay-off of about three cents an acre. It helps defray county and state land and fire protection taxes and the company's own fire prevention program, all of which have averaged about nine cents an acre yearly.

"The problem area which first started J. Neils foresters thinking about range management possibilities was the Plateau block. This is a gently rolling tableland. The company owns some 30,000 acres in this unit, which is in a transition eastside-westside forest type, with a high percentage of Douglas in the original stand," says Rathert in his review of the original problem.

In a 1938 grazing survey the senior class of the College of Forestry at the University of Washington recommended that the 30,000 acres of cutover company land in the Plateau block be retained for timber production. Stressed was the importance of making the leased forage resource help defray annual fire protection and tax costs.

But the report also pointed out that if this were to be done, present grazing misuse would need correction. Abuses specifically cited included dissipation of the range cover, browsing and trampling of natural reproduction and appearance of erosion scars. This was almost an ultimatum—"if you don't manage the range, you may not get a full tree crop."

In late 1938 the Soil Conservation Service also became interested in the company's land-use problems. Preliminary inspections indicated possibilities for range management demonstrations on the Plateau block. In early 1939 range examiners completed a detailed survey of 67,000 acres in the Plateau block, including J. Neils and other ownerships.

In this report were many range depletion indictments which were typical of any that might have been made in any area before timber cutting practices were fitted to good forestry and before state slash disposal requirements had been scaled down to promote preservation rather than destruction of young timber growth and forage crops.

"The list was long: earlier clearcut logging and broadcast burning of slash; concentration of livestock in meadows; lack of adequate water development and poor salting plans, resulting in improper stock distribution; overgrazing through trespass because of lack of fences and other controls; abandonment of small farms; overgrazing fostered by a leasing system based on a flat rate per acre, without control as to the number of stock per acre; bedding of

sheep more than one night in one place; close herding of sheep; salting near water sources," summarizes Rathert.

Local custom sanctioned "open range" grazing by stock without number or seasonal control. Stockmen could run livestock on unfenced property because there was no state herd law. The fencing of private range wasn't tolerated by livestock men as a group. Many areas were grazed by both sheep and cattle several times in a season because lessees were not protected from trespass by adjacent lessees' livestock.

Cattlemen could lease a waterhole and graze the surrounding country from this "home" unit. Most grazing started in March before the beginning of spring growth. Forage plants were either trampled or pulled out. Extreme intermingling of ownership complicated trespass control.

Mismanagement had depleted 85 percent of the range's vegetative types, with another 12 percent in still poorer condition. Carrying capacity averaged about 14 acres for a sheep season or 70 acres a cow season. The browse-shrub type comprised 19 percent of the range and coniferous timber 64 percent, the latter mostly an overstory of Douglasfir remaining from the pine logging of previous years.

To cure these range ailments, it was recommended that actual carrying or "eating" capacity of the land be used as a basis for livestock use, with reductions to be made after mutual discussions. Conversion of the leasing system to a per head basis also was suggested, with a rate adjustment producing approximately the same annual grazing revenue.

Other proposals included: setting of opening and closing dates; use of range mostly for sheep; spring, summer and fall use, with special attention to be given in the spring to range readiness; better stock distribution through proper salting, fencing and water development; use of a range rider to patrol fences, count stock, check trespass, carry out salting plans and break up cattle concentrations; reseeding of overgrazed meadows.

This spelled new opportunity for the land!

Company officials and Soil Conservation Service technicians explained the range improvement plan at community meetings held with local permittees. Emphasis was placed on the expected build-up in range carrying capacity. Permittees were convinced that their ultimate welfare was in controlled grazing.

As a result, cooperative land-use agreements were worked out between J. Neils as landowner,

the permittees as operators and the Department of Agriculture as technical agency.

The plans called for many physical improvements. These included development of water sources, construction of drift fences and cattleguards, and establishment of range exclosure plots to study range recovery.

Permittees and the company paid for fence posts, fencing, cement water troughs, cattle guards and construction material. Some labor assistance was received from a Soil Conservation CCC camp. Technical supervision was provided by company and Service men.

Copies of the grazing plans were furnished to the company and permittees. Each included soils and range-type maps, with grazing units blocked out by seasons and carrying capacities. Grazing practices were itemized.

A restricted grazing season of 4½ to 5 months was provided. Spring turnouts were to be gauged by vegetative readiness, ordinarily in late May or early June, instead of March.

In 1940 the Underwood Soil Conservation District was organized by ranchers to carry on conservation work started in the country. War-time years slowed down the physical improvements that were planned and also resulted in a shortage of manpower for adequate follow-up and maintenance work.

But today the accomplishment record is impressive; something new has been added to the pine lands!

According to General Manager Rathert, the range improvement program has been carried forward intensively. Physical improvements now include 45 miles of drift fence, enclosing 14,000 acres of managed range lands; 19 developed water sources; five cattle guards; three test plots; and a range rider's cabin on the Plateau block and grazing area.

Particularly successful and beneficial has been the range riding program. "Cow-poke" Ed Jones has proved efficient in this roving assignment. Hired cooperatively by J. Neils and the Glenwood Cattle Association, which was organized in 1946 by 16 ranchers in the Glenwood Valley, Jones puts in his full time inspecting fence lines and checking range use. He lives in his cabin on the Plateau block and stays with the cattle during their grazing period on the various pastures.

Chief Forester Elmer Lofgren, sums up the record for Jones' effectiveness.

"For the first time in the memory of permittees, trespass stock almost reached an absolute minimum after Jones went on duty. His looking after cattle at calving time has paid off in larger calf crop. Cattle came off

the range in much better condition, which means a better market price."

It is estimated that to date the carrying capacity of the managed range has been stepped up at least ten percent.

In contrast, other unmanaged adjacent ranges have deteriorated to wasteland with no carrying capacity. Company officals believe that ultimate range capacity can be doubled in a 20-year period.

On the tree growing side of the picture, Forester Lofgren reports an increase in natural restocking from 48 to 68 percent stocked in a 20-year period. A snag falling program has been carried out, with about 8000 snags felled to date; approximately five percent have had salvage values.

"A total of 219 acres of experimental pine plantations have been established since 1939, with about 155,000 seedlings set out. The first plot of 23 acres in 1939 proved that such plantings were feasible. Trees in that area today are about 15 feet high, with an average survival of over 90 percent. Complete grazing protection was given this area during the early years," says Lofgren.

Other phases of the program include the seeding of old logging trails, skid trails, landings, old meadows, and other suitable areas for grass growth.

Fences and water holes are being put in. "Riding fence line" is now a tree farmer's chore.

Pine trees and grass get along well, say these eastern Washington land managers. It means more land at work, producing income dollars.

Acre of Corn Silage Produces Ton of Beef

One acre of corn silage, supplemented with cottonseed cake and mineral, produced 2310 pounds of gain on 400-pound calves used in testing winter rations at the University of Missouri.

Fed at a rate of 80 per cent full allowance, the calves fed corn silage made an average daily gain of 1.22 pounds and required 1643 pounds silage and 104 pounds of cottonseed cake for 100 pounds gain. The yield of silage was 19 tons per acre.

Two other lots of calves were included in the test. One fed on alfalfa hay and mineral mixture gained at the rate of near one pound a day. The other, fed on ground corn cobs, blackstrap molasses, cottonseed cake, vitamin A concentrate and mineral mixture, averaged 1.07 pounds daily gain.

University of Missouri

Three Ways to Easier Silage

New Jersey farmer finds ways of making silage which reduce the costs . . .

Condensed from New Jersey Farm and Garden

PUTTING up silage is an easier job now at the Moebus Farm near Clinton, New Jersey. Here's what 50 farmers saw there on a recent tour:

Bisulfite is used as a preservative and applied with a homemade device that cost Moebus only about $3. It consists of a milk can to hold the powder, a couple of pipe nipples, a gate valve and piece of radiator hose.

Two steel cables attached to a false front of his wagons pull the load off. A third cable goes forward over a pulley, and back to the roller and pulls the front back in place. It takes only a few minutes to pull in, unload and be ready to refill.

Moebus has telescoping tongues on his silage wagons. They slide in or out, making it unnecessary to move the tractor or wagon to hitch or unhitch. A snap catch similar to the automatic coupling on model trains is engaged by merely backing up the tractor.

Visitors were told that Moebus' 75 cows get almost all their roughage from only 50 acres of top yielding forage stands. Fertilizer was applied after first cutting. An 0-12-24 was used to maintain high potash levels for legumes. To stimulate grasses a 5-10-10 was used.

John Baylor, Rutgers extension agronomist, pointed out that some preliminary research results show that best use of fertilizer is obtained by top dressing after first cutting.

Reprinted by permission from New Jersey Farm and Garden, Sea Isle City, New Jersey

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AS EXPORT STIMULUS, USDA WILL STUDY MILK RECONSTITUTION possibilities in the Far East. The plants could be built in Asian countries by local governments or persons, or by United States private enterprise. A reconstitution plant utilizes modern methods for processing butter-oil—the pure fat of milk—with powdered nonfat dry milk solids and water to make whole fluid milk of high quality. Each plant established could provide a market for from 800,000 to 1,000,000 pounds of United States dairy fats a year.

Cows Are Made in This Heifer Plant

A California farmer finds wholesale raising of dairy heifers profitable . . .

Condensed from California Farmer

Les Dodd

I. D. KINDY, Riverside County California, has developed an interesting business of raising replacement heifers for land-short dairymen in the Los Angeles milkshed.

He takes the heifers from the point where commercial calf raisers usually stop and grows them out in palm-shaded dry lots, on desert-grown hay, until they are ready to freshen.

The operation is established on a commercial feed-lot basis as dairymen contract with Kindy to grow their own heifers. He is paid only for the pounds of gain that he puts on, weight in, weight out basis, at the nearest respective scales, with no shrink. The fee is based on hay prices which figure out to 20 cents per pound of gain as of last February 1. If the price of hay changes materially, the fee is increased or lowered.

Kindy says that his charges are at a fairly even rate. The sliding scale contract is a protection against extreme price changes. Kindy feeds his own hay, raised on 360 acres that he farms, as far as it goes, and purchases hay when his supply runs out. The land is devoted to hay and cotton about 50-50.

The calves are accepted when large enough to live on hay, at about 400 pounds, and get nothing else, except cull vegetables when those are available. Some 500 to 600 are fed year round in three lots holding about 150, 175 and 210 head. The number depends on the size of the heifers. Kindy does minor veterinary work free of charge but the cattle owners pay for medicine or veterinary bills if a doctor is needed.

The heifers are bred at 26 to 30 months of age and are taken back to the various dairy ranches when they are close to calving.

Reprinted by permission from California Farmer, San Francisco, California

The plan has been progressing now for two years and the dairymen seem to like the arrangement. At least they keep coming back with more heifers.

One secret of the business can be described as plain good management. For instance, Kindy has been working with dairy cattle for many years and knows how to feed and care for them to make them grow.

He spends about one hour a day walking through the lots watching the heifers. In other words, he anticipates troubles before they become serious. He fertilizes his hay in a way that gives it greatest feeding value and allows him to make superior gains. He pets the calves and keeps them so gentle that they are very little trouble to handle or break to milk.

The yards are dusted from the windward side to control flies. Pink eye and pneumonia are the most trouble but both are treated quickly to prevent spreading through the herd.

Excellent gains are obtained in this climate, using the strong feed grown there. Some dairymen indicated that their heifers matured close to six months ahead of equivalent growth in the coastal area.

Kindy's ranch is located near the mountains on the west side of the valley, near the opening of an ordinarily dry canyon. However, that innocent looking slash in the mountains dropped a cloudburst on Kindy's ranch two years in a row, an incident that might occur once in 50 years. It got 500 bales of cotton once, 80 acres of hay another time and cut the ranch all to pieces.

"In short, it set me back about $75,000 in two years," Kindy said. "I was out of operating capital and, more or less in desperation, hit upon this dairy idea to help hold things together and get back on my feet. We're still experimenting—actually—but it seems to be working very satisfactorily. It isn't a job for an amateur. I'll guarantee that," Kindy said.

It looks easy, but Kindy has handled dairy cattle so long that it is relatively simple for him. He has tried green-chop feeding but found that he could make better gains on dry hay. "Also it takes a skilled mechanic to keep a field chopper running regularly," he said. "I'm not advocating what anyone else should do, but I know what works the best for my setup."

Woodpeckers are going soft, says the Wisconsin Department of Agriculture. It seems the birds prefer digging corn borers out of corn stalks to hammering on tree trunks for a meal of beetles and worms.

TRACE MINERALS IN ANIMAL PRODUCTION

Within recent years much new light has been thrown on the need of trace minerals in animal feeding. . .

Condensed from Farm Management

IF THE old German proverb "We are what we eat" applies to the human animal—and nutritional research is making this more evident every day—it is even more true of the herbivorous, or non-meat eating animals which through their body tissue or their milk supply us with food.

There are several reasons why we know more about the functions of soil minerals in producing vigorous, healthy food-supply animals than we do of their part in human nutrition. First, the herbivorous animal must get all the essential nutrients from plants, and plant tissue analysis can rather accurately establish the presence of various minerals and in what quantity. Meat-eating animals can and do get undetermined quantities of minerals from the meat tissue they consume. For example, carnivorous animals usually get adequate sodium and chlorine from the animal tissues they eat. Herbivorous animals must usually receive salt supplements to provide these essential elements.

Second, nutrition studies are easier to control in cows, sheep, pigs and chickens than in humans. The control animals are expendable. It is also easier to analyze the content of their rations and keep accurate records for comparison.

Third, the plant-eating animals are closer to the soil, are more directly affected by soil and plant deficiencies than is man. The smaller variety of animal diet makes deficiency diseases show up quickly in them.

Let's look at the generally recognized mineral needs of our food-producing animals and see how they are tied up with the presence or absence of these minerals in the soils which produce the feed eaten by these animals.

Thirteen Vital Minerals

Some 13 different minerals have been definitely established

Reprinted by permission from Farm Management, 4511 Produce Plaza Los Angeles, California

as necessary to animal life. These include chlorine, especially as associated with sodium in common salt. Counting the two mineral elements of salt, there are seven major and six minor or trace minerals vitally necessary in animal nutrition. The 13 are calcium, potassium, sodium, chlorine, magnesium, phosphorus, sulphur, iodine, cobalt, manganese, copper, iron and zinc.

Any rancher or farmer will quickly recognize the part played by two of these minerals, calcium and phosphorus. They are essential to the formation of bones and teeth. But the soft tissues of the body, muscles, nerves, blood also contain minerals, in fact the entire 13 listed. This means that minerals are necessary for respiration, circulation, digestion, reproduction, motion and all the other life functions.

Just because some minerals are classified as major and others minor does not mean that the minor are less important because they are contained in smaller quantities in the feed or in the animal body. Regardless of the quantities ordinarily present in feeds or required by animals, if a certain mineral is needed, even in the tiniest amounts, then lack of it may produce just as bad results as a shortage of a major mineral such as calcium or phosphorous.

While this report is primarily concerned with the trace minerals, every animal producer should understand and know how to supply the common elements needed in greater amounts to produce vigorous, healthy gain and resistance to disease. These are:

SODIUM AND CHLORINE. These two, perhaps more than any other common elements, must be added to the rations of herbivorous animals. Common salt will provide these elements and they are generally needed except where animals are grown within very short distances of the seacoast. Normal requirements can be met by feeding from 1½% in the rations of chickens and pigs and 1% in the rations of cows. Self-feeding is usually adequate in the case of cows and pigs, but at the beginning of a self-feeding program salt-starved animals may need added amounts.

Protein utilization, feed efficiency and maintenance of appetite depend on adequate salt intake. Sodium makes up 93% of the body bases and chlorine is the chief mineral element in the stomach acid. Small wonder, then, that salt supplements are considered one of the basic principles of good husbandry.

CALCIUM And PHOSPHORUS. For obvious reasons, this pair of "major" ele-

ments is important to all forms of livestock. Normally, they are added as a supplement, usually steamed bone meal, dicalcium phosphate or deflourinated phosphate. If only calcium is needed, ground limestone, oyster or clam shell will do.

There are a few local areas where a phosphate deficiency is severe enough to cause animal disease. Kenneth Beeson says, "An abnormally low level of phosphorus in the soil and in many forage crops is the most widespread and economically important factor of nutritional troubles in grazing animals."

To correct these deficiencies he recommends direct feeding of the supplements listed above, but he also points out that it is practical in many deficient areas to increase the amount of phosphorus in the soil. The result is forage of higher nutritive value.

Trace Minerals

SULPHUR. This common element is used in the animal body as a part of certain amino acids. These acids are building blocks of proteins as we now know them. The sulphur-bearing amino acids are important in carrying on the body's normal oxidation processes. Sulphur is also found in insulin and in several of the B complex vitamins. It is contained in the skin, hair and wool, and makes up 1 to 2% of the ash content of milk.

Fortunately the stockman need not concern himself with this element. There is no evidence of any benefit from feeding supplements of sulphur, either as such or in the form of epsom salts. The usual animal rations contain sulphur in the form and apparently in the quantity needed.

POTASSIUM. This abundant mineral is found in the red cells of blood and in the muscle tissues generally. It also functions in heart action. Though it is required in abundant quantities by plants in its fertilizer form, potash, it is usually classed as a minor element in animal nutrition.

Fortunately it exists in great quantities in many soils and where it is deficient it can be applied with other common fertilizers easily and at low cost. Thus, for all practical purposes the stockman can forget it.

MAGNESIUM. This element is found in bones, muscles and in the enzyme system responsible for carbohydrate burning or metabolism. Though the body seems able to adapt itself to low levels of magnesium, extreme deficiencies in diets of experimental rats have produced tetany and death. A disease, grass tetany or grass staggers, has been reported in cattle and

it has been generally attributed to a magnesium deficiency or imbalance of this element with calcium.

According to Lundquist of WSC, magnesium is rather abundant in ordinary mixed rations. In those occasional areas where grass tetany is suspected, he recommends making sure that magnesium is actually involved. If it is needed, it should be used until symptoms disappear, but not fed routinely as a supplement to ordinary rations.

Thus, we have seen that of our family of 13 minerals needed to sustain animal life, four are generally considered major elements, and of the minor elements, sulphur, potassium and magnesium are not too important as far as feeding is concerned. The remaining six—iron, copper, cobalt, manganese, iodine and zinc—are important in feeding though not always necessary to add in supplemental form.

IRON. A lack of iron in a ration causes anemia. Copper and cobalt deficiencies are associated with the same symptoms. Chief symptoms are lack of appetite, unthriftiness, harsh or dead haircoat, reduced reproduction, disturbed digestion with diarrhea and general nervousness and pallor. Iron is found in the body in minute amounts, but it is an essential element in the red pigment, or hemoglobin molecule of the red blood cells. Copper is essential to the formation of hemoglobin and without it red cell building cannot take place.

Iron is rarely deficient in diets of adult animals, but it should be provided for young stock, especially pigs which are raised in confinement. The deficiency can be avoided by providing clean soil and sod for the young pigs. Or, if they must be raised in confinement and show signs of anemia, most practitioners recommend painting the udders of the sows with ferrous sulphate. Add one pound to one gallon of water and swab the udder with a paint brush. The iron sulphate contains enough copper as an impurity to supply that element.

Anemia also affects calves and lambs where the milk produced for these young animals is low in iron and copper. On low iron intakes animals may suffer from internal and external parasites; they respond to iron supplements of less than 50 parts per million in dry matter of the ration.

COPPER. In addition to working with iron in building of hemoglobin, copper is necessary in high molybdenum areas to protect cattle and sheep from molybdenosis or molybdenum

poisoning. This mineral is taken up in poisonous amounts by plants growing in soil containing an oversupply. The use of phosphorus in the animal body is disturbed by a deficiency of copper and such diseases as rickets may occur. Wool formation, too, is dependent upon copper nutrition and the use of a vitamin called choline may also depend on adequate copper intakes.

Copper deficiency is not a common problem in forage plants. Copper is available as a supplement and may be provided in trace mineral premixes for mixing in grain. A proper dietary level of five to ten parts per million in the dry matter of the ration is adequate unless molybdenum is present at levels above one part per million. More than this quantity of molybdenum makes additional copper necessary to protect cattle from molybdenosis.

COBALT. The essential vitamin B12 contains approximately 4% of cobalt and it is likely that farm animals use cobalt in this form. Vitamin B12 is for the formation and metabolism of hemoglobin. Cobalt also has a slight growth stimulation effect on some animals. Ruminants have a greater requirement than poultry or swine, and deficiencies exist in many parts of the country, though not to a harmful extent in the Pacific slope.

Deficiency Symptoms

Symptoms of animals suffering from this deficiency are those generally associated with anemia, such as, poor appetite, rough hair coat and general appearance of unthriftiness.

If a known cobalt deficiency exists, add one quarter pound of cobalt sulphate per ton of grain mix.

MANGANESE. This trace mineral is needed by the animal body for several intricate oxidation changes. According to some authorities, it is essential for tissue formation of ascorbic acid, or vitamin C. There is evidence that vitamin C is needed for reproduction as well as normal growth and bone formation in livestock and poultry. Lundquist tells of an experiment on which he worked wherein bulls on a manganese-deficient ration produced semen of poor quality.

In chickens, manganese has a part in the prevention of a perosis disease, commonly called slipped tendon.

The amount of manganese available in various species of plants and in the same plants grown on different soils varies considerably. The content in plants grown on acid soils is higher than in plants grown on alkaline soil. Soils deficient in

manganese do exist in the seven western states but they are generally associated with orchard crops (peaches, apricots and citrus) rather than in the grass, grain and legume-producing areas.

Hence, most standard concentrate rations for livestock will be adequate in manganese counts as will most western pastures. Lundquist raises an interesting question on this latter point. He wonders about the possible effect of forcing grass production through irrigation, and what it may be doing to manganese content and its possible effect on the sterility problems which have been brought to his attention recently. He has a survey planned to see whether chemical analysis in areas suspected of trace element deficiencies will reveal manganese problems.

The part manganese supplements play in livestock nutrition is so complex that it is as yet difficult to establish definite deficiencies in western rations. But in poultry rations, one quarter pound of manganese sulphate is recommended for each ton of feed. In areas of known manganese deficiency in cattle, rations containing 15 to 25 parts per million of dry matter should prove adequate.

IODINE. This element is needed by the thyroid gland to perform its function of making absolute necessity in the animal body for controlling the rate at which fuel is burned. A deficiency produces striking changes in livestock such as big neck or goiter in the case of lambs, calves and colts; hairless pigs in the case of swine; and in most animals, weak offspring which may be dead or too weak to live at birth.

Stockmen should watch carefully for this deficiency, but iodine should not be added where a deficiency does not exist. Excessive amounts are harmful.

Fortunately, deficiencies of iodine can be easily corrected in animals as in humans through feeding iodized salt containing about .007% iodine. Since iodine is easily oxidized by exposure to air, sunlight and rain, be sure to purchase the stabilized form containing sodium thiosulphate.

All of the western states except Arizona, New Mexico and western California are in the so-called goiter belt so stockmen in all but these regions should keep careful watch for the telltale symptoms.

ZINC. A deficiency of this mineral is more important in plant life than in animal, but it is known to affect the rate of intestinal absorption and has been a factor in sterility of un-

known nature of cattle. It is difficult to develop an experimental ration low enough in zinc to cause symptoms. In addition, zinc is so widespread in nature that it is not a problem of the livestock feeder.

There are other minerals which play a part in plant and animal growth, but for practical purposes those listed above seem to be all that need concern the farmer or rancher. And many of these offer little or no protection to western farmers because of the character of our soils. Also, carefully planned and balanced fertilizer programs help obtain the highest nutritive quality in western feed and food crops.

Principal value of fertilizer programs in producing highest nutritive quality in forage or hay is not the changes in mineral content in the plant which they bring about. Rather, the value is in the higher proportion of legumes in a fertilized pasture. For example, the calcium content of timothy hay is about .4% and of alfalfa about 1.7%. The cobalt content of alfalfa and other legumes is also several times higher than that of timothy growing in the same field. In fact, many technicians feel that cattle or sheep will never suffer a deficiency of calcium or cobalt where 50% or more of their forage is legumes.

In summary, then, most authorities agree that trace minerals are essential in animal nutrition, that proper rations produced on non-deficient soils provide the minerals needed and that where known deficiencies in the ration exist trace minerals may be added either as a pre-mix for mixing in grain or as a trace-mineralized salt. But, when fed as mineral supplements, they must be added at careful concentrations for complete safety.

Some enthusiasts have recommended adding trace minerals to the soil on the general assumption that soils are deficient in all trace mineral elements. Paul Phillips, University of Wisconsin biochemist, says this would be wasteful.

"At the present state of our knowledge" he told a group of feed men, "the application of trace minerals as a soil fertilizer in order to insure proper amounts in the crops produced thereon is costly, wasteful, and unnecessary as far as feeding livestock is concerned. It has been amply demonstrated by many experiment stations and investigators throughout the world that the direct addition of mineral elements to the ration of livestock is a sound economic practice when mineral elements are needed."

BEEF CATTLE

Feeder Calves	**Nov.**	**1953**
Dwarfism	**Nov.**	**1953**
New Beef Breeds	Dec.	1953
500 Beef Club	**Dec.**	**1953**
Baby Beef Program	Jan.	1954
Weigh Sires and Calves	Jan.	1954
Beef Outlook for '54	**Feb.**	**1954**
Truth About Dual-Purpose Cattle	**Feb.**	**1954**
Beef Costs Down 20%	March	1954
Efficiency in Beef Production	**March**	**1954**
Production Testing Beef Cattle	April	1954
Self-Service for Steers	May	1954
Hurry-Up Hormone	June	1954
A Good Herdsman	June	1954
Rumen Industries	Aug.	1954
Need More Culling?	Aug.	1954
Cattle Gains Too Costly?	Aug.	1954
This Feeding Game	Aug.	1954

CONSERVATION

Old Stuff in Old World	**Nov.**	**1953**
Christmas Trees for Eroded Land	**Nov.**	**1953**
Judging Land	**Oct.-Dec.**	**1953**
Conservation for More Farms	Dec.	1953
Remade Farm	**Dec.**	**1953**
Your Farm Pond	Jan.	1954
Conservation Farmer	Jan.	1954
Brush Patch to Seeded Field	Jan.	1954
Grass Waterways	**Feb.**	**1954**
Water Storage is Good Business	**Mar.**	**1954**
Improvements Unlimited	May	1954
Washington County	June	1954
Poverty Ridge	June	1954
Built Back His Farm	June	1954
Failure to Success	Aug.	1954
Way to Stop Gullies	Aug.	1954

CROPS

Stop Wheat Rust?	**Nov.**	**1953**
Control Corn Rootworms	Jan.	1954
Thicker Stands, More Corn	**Feb.**	**1954**
200 Bushels Per Acre Corn	**March**	**1954**
Weed Control in Corn	April	1954
Control of Corn Insects	April	1954
Band Seeding Legumes	**May**	**1954**
Hybrid Seed, No Detasseling	**May**	**1954**

DAIRY CATTLE

New Scours Drug	**Nov.**	**1953**
$100 More A Cow	**Nov.**	**1953**
Artificial Breeding	**Nov.**	**1953**
20,000 lbs. of Milk Per Man	**Nov.**	**1953**
Calf Factory	Dec.	1953
Dairy Muddle	Dec.	1953
Marks of Good Milker	**Dec.**	**1953**
Watering Feed	Dec.	1953
Raise the Calf	Jan.	1954
World Record Dairy Herd	Jan.	1954
Pamper the Dry Cow	Jan.	1954
Paying for Solids—Not Fat	Jan.	1954
Heavier Calves, No Scours	**Feb.**	**1954**
Milk 3 Times A Day	**Feb.**	**1954**
New Approach to Mastitis	**Feb.**	**1954**
Your Grain-to-Milk Ratio	March	1954
Herd Management and Fat Yield	March	1954
Simplify Milk Inspection	April	1954
Artificial Breeding	April	1954
Dairy Price Supports	May	1954
Test Tube Magic	June	1954
Milk 84 Cows in 2 Hours	Aug.	1954
Frozen Semen	Aug.	1954
New Dry-Milk Bread	Aug.	1954

FARM BUILDINGS

Self-Feeding Silo	**March**	**1954**
Larger Cow Stalls	April	1954
New Cow Barn	May	1954
Dry Lumber on the Farm	May	1954

FARM MANAGEMENT

Farm Land Prices	**Nov.**	**1953**
Farm Problems in 50's	**Nov.**	**1953**
Check Farm Fire Insurance	**Nov.**	**1953**
Safety is No Accident	**Nov.**	**1953**
Rural Fire Protection	Dec.	1953
Farm Leasing Practices	Jan.	1954
Planned Farming Pays	Jan.	1954
Ownership, Father to Son	Jan.	1954
Farmland Price Letdown	Jan.	1954
How To Save On Income Tax	**Feb.**	**1954**
1954 Outlook	**Feb.**	**1954**
Ease The Squeeze in '54	**Feb.**	**1954**
No. 1 Farm Problem	**March**	**1954**
Do Farmers Face Complete Control?	March	1954
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Four Heads Better Than One	May	1954
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435 Farmers Own Farm	June	1954
Why Farm Half the County	June	1954
Don't Follow the Season	Aug.	1954
Class Leader Farming	Aug.	1954

FARM EQUIPMENT and MACHINERY

Tailor-Made Equipment	**Dec.**	**1953**
Ancient Irrigation System	Dec.	1953
Save Money on Motors	Jan.	1954
Farm Fire Department	**Jan.**	**1954**
How To Repair Tractors	Jan.	1954
How Not to Drive a Tractor	**March**	**1954**
When To Buy Machinery	April	1954
Power Feeding	June	1954
Barn Hay Drying	Aug.	1954
Good Water from Pond	Aug.	1954
Fog Fire Fighting	Aug.	1954

FEEDS

Cook Feed for Finish	**Nov.**	**1953**
Feed More Forage	**Nov.**	**1953**
New Way Grass Silage	**Nov.**	**1953**
Plastic Packaged Silage	Dec.	1953
3 Ways to Dry Hay	Dec.	1953
Feeding Molasses to Dairy Cattle	**Feb.**	**1954**
Real Value of a Dairy Feed	**Feb.**	**1954**
Drying Hay at Hominy Hill	March	1954
Grass Silage Cuts Costs	March	1954
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Feed More Roughage	Aug.	1954
Feeding Molasses	Aug.	1954
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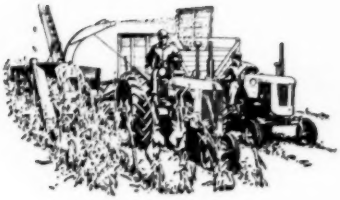
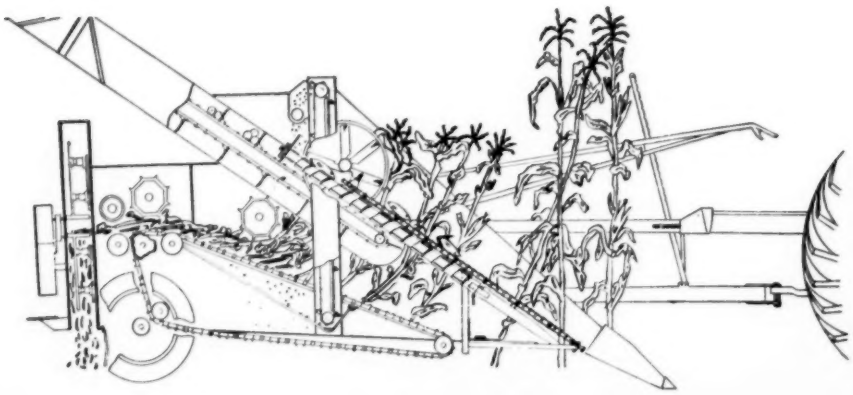


Here's a new idea and tremendous savings for wintering beef cows and young stock. A new machine, introduced by J. I. Case Company of Racine, Wisconsin, combines a corn picker and silage chopper. You pick your corn when the ears contain about 35% moisture and the stalks about 70%. Ears go to the crib to be dried mechanically. Stalks and leaves go to the silo. If you pick late, corn stover can be used for bedding.

At Iowa Experiment Station, this type of harvesting got close to 7 tons of silage an acre. On a dry matter basis, this will run 7 to 8 percent protein where 100 pounds or more of nitrogen was applied ahead of corn planting, according to Bob Garst of Coon Rapids, Iowa. He believes total cost for the operation would be about $19 per acre. Figure corn picking at $5 per acre, then the silage costs only $2 a ton.

Using this low-cost silage and seeding the corn land for fall rye pasture, Mr. Garst believes you can winter a beef cow for about $6. Normal cost in his area is about $25.

It's a new idea you can check this winter and consider for next year. Look for a longer article on the same subject in next month's Farmer's Digest.